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VOL. XXXI DECEMBER, 1933 No. 8

EDITORIAL

SUSTAINED YIELD AS AN OBJECTIVE

AROUND the subject of "sustained yield" centered much earnest discussion in the recent session of the Forest Conservation Conference on Article X of the Lumber Code. It well-nigh crowded out "forestry" and "conservation." These general terms have served well in the past, but the tendency now is towards a term with more exact meaning. Sustained yield rings the bell.

Conceptions of sustained yield, however, are widely variant. Some appear to see in it a veritable panacea, a quick and certain solution of many of the country's forest ills. They would vote it in at once and settle the vexatious problem of forest conservation. Why worry about particulars or slow-moving methods. This transcendent view is like a glorious sunset,—charming but difficult to analyze and quite impossible to explain to minds that ask for somber details.

Others who find a strong appeal in the idea of sustained forest yield are much inclined to consider it from a regional point of view. They regard the problem of forest conservation and renewal as a regional problem and they would like to see it attacked and solved by regions. In their discussion it is regional sustained yield they have in mind. Among those who hold this view a considerable number appear to feel that this desirable objective may be quite near at hand.

However several exact definitions of sustained yield which were advanced in connection with the conference do not at all reflect the regional viewpoint. On the contrary they are so exact and restrictive as to indicate application strictly to definite, somewhat limited, parcels of forest land. One is as follows:

"The yield or cut of timber from a forest which is managed in such a way as to permit the removal of an approximate equal volume of timber annually or periodically, the volume of timber removed being equal to the increment."

This conveys a simple, easily grasped idea. It places sustained yield on a basis where growth and production can be determined with approximate exactness and in due time brought into balance.

These divergent conceptions indicate that however much we may have discussed sustained yield we have not in our thought fully explored its meaning and application. A serious difficulty with the definition just quoted is that it is limited to definite, restricted tracts. We cannot for present purposes think merely in terms of single tracts; we must think in terms of great areas, of entire forest regions. The definition fails when we try to apply it regionally. Take the West Coast. In that great forest region the Forest Service says saw-timber growth is now less than 10 per cent of the volume

of the products removed. Can anyone tell us how growth could quickly be boosted tenfold? Can we even picture the possibility of reducing production by 90 per cent? It is quite as idle to think of bringing the two together at some half way point. Sustained yield for the West Coast cannot be thought of except as a possibility of the distant future. The vast reserve of old growth timber must be reduced and the area of cut-over land must be greatly increased. Eventually the curves will meet but how far in the future no one can tell.

Consider another important region—New England, where we meet wholly different conditions and find a different problem. There both in volume and quality the reserve of merchantable timber already has been reduced too low. In New England the gap between growth and production is not wide. It might conceivably be closed within a decade or two, giving sustained yield according to the definition. Would that satisfy us? No. The Secretary of Agriculture has tersely stated why:

"With resources such as forests where the capacity for sustained production has already been reduced below requirements, conservation may also involve the building up of productivity above existing levels."

That is the point; the level of productivity both as to volume and quality of material must be substantially raised in New England before we shall be satisfied with results. This will require good silvicultural practice through years of effort. For New England as for the Pacific Coast, sustained yield on a satisfactory basis is not to be realized at once or in the near future.

If the Lake States and the South be likewise considered it will be found that in those regions also an acceptable balance between forest growth and forest products output cannot soon be attained.

Because regional sustained yield is not immediately or soon to be realized, shall we reject those expressive words as having no regional application? That does not seem to be necessary. It is desirable, highly desirable, that we clear our minds about the situation. Regional sustained yield may well be set up as a distinct objective towards which we may direct our efforts. Nothing need deter us from laying out our course in that direction. But let us remember that this objective like a distant mountain peak as it comes into view is probably a long way off. Forest surveys, growth determinations, forest plans, on a more comprehensive scale than anything hitherto attempted will be required, because we can get nowhere in this advance without reliable forest data. Guesses will not suffice.

Paralleling this will be the steps to be taken by forest operators,—preservation of young growth, provision for reseeding, true selective cutting having in view both maintaining and improving growing stock, partial cutting of every character,—these are steps on the long road to regional sustained yield.

It is very important to recognize one phase of sustained yield as a present reality. This phase is represented by those individual or corporate operators or timberland owners who already have adopted the policy of removing no more timber from their lands than is replenished by growth. They are fully meeting the technical definition of sustained yield. Some are doing more. They are building up both quantity and quality of growing stock. This concept has won the earnest thought of many timberland owners in the past ten years and the plan is going into effect in a greater number of cases than many foresters appear to realize. It is one of the most hopeful signs of the present forest situation. It is true present-tense sustained yield; something to be recognized, encouraged and aided.

WILLIAM L. HALL.

ROBERT YOUNG STUART

By HERBERT A. SMITH

Assistant Forester, United States Forest Service

MAJOR ROBERT YOUNG STUART, D. Sc., Chief of the United States Forest Service, was instantly killed by a fall from a seventh-floor window of the Atlantic Building, the Washington headquarters of the Forest Service, on the morning of Monday, October 23, 1933.

The precise circumstances are unknown. He had begun the day's work betimes, alone, in a room that was probably overwarm. Rising from the papers which had begun to receive his attention (as was evident from their place and condition on his desk) he seems to have crossed to the Associate Forester's office, found no one there, lifted a window for air, and in a sudden onset of vertigo or fainting lost his balance and fallen outward.

He had had occasional attacks of vertigo for some time, had been indisposed over the week-end, and had almost yielded that morning to Mrs. Stuart's plea that he stay at home and get more rest. For two months or more, indeed, he had been suffering from the effects of the severe strain which the enlarged responsibilities and opportunities for forestry under the "New Deal" had involved. But he had held himself sternly to his task, with no outward evidence discovered even by his closest associates that his powers of endurance were becoming seriously overtaxed.

On the day of his death he was at his desk a full hour before the official time of opening. At the door of the Atlantic Building he had smiled encouragement and assurance to his anxious wife, as they parted. Many know that smile of "Bob" Stuart's—of our strong, trusted, capable, loved leader; and we are sure that he walked that morning to his accustomed post of duty and his unexpected death with a will set to meet firmly whatever the day might have in store.

For in him courage, purpose, and high resolve were matters of course. With them were singularly combined simplicity, genuineness, heartiness, and friendly spirit. A very rock of a man in dependability and uncompromising loyalty of motive, he was also unassuming, approachable, deeply human, considerate, generous. There was nothing aloof, pretentious, or austere in his make-up. Of Scotch-Irish blood, he blended with sturdy ruggedness of character a quality of homely warmth, openness of sympathy, quick and deep responses and wide interests. He was a noble comrade, a staunch friend, a true American of the best kind; country-bred without provinciality, democratic without a trace of commonness. None could know him without admiration and trust, nor lose him without lasting grief.

The pages of the JOURNAL OF FORESTRY in one or two recent issues have disclosed a disposition in some quarters to disparage the quality of public leadership in forestry matters exercised of late from within the profession. While it is not uncommon for side-line critics watching the game to criticize the choice of plays, it does not necessarily follow that advance toward the goal would in fact have been facilitated had their desired field strategy been pursued. With all that has been said in mind, the writer cannot do otherwise here than express his deep con-

viction that both the leadership of the Forest Service and the exercise of such public leadership as was within his power by the late Chief of the Forest Service needs no defense, but has been throughout competent, sagacious, and far-seeing as well as deeply conscientious and inspired by the strongest sense of responsibility. Regarding the latter there can be, it is true, but one mind.

Major Stuart was born in South Middleton Township, Cumberland County, Pa., February 13, 1883. His early education was in the grade schools of Pennsylvania, at first in Harrisburg and later at Carlisle, where he also went through high school and attended Dickinson College. He received his B. A. degree from Dickinson in 1903, aided his father in business for a year, and then enrolled in the Yale School of Forestry, where he was graduated with the M. F. degree in 1906—three years after William B. Greeley, whom he was later to succeed as Chief of the Forest Service, and one year after Ferdinand A. Silcox, who succeeds him. In the same year he received the degree of M. A. from Dickinson College. Along with his fellow-students at Yale he thereupon took his place in that relatively small group of early foresters who began in 1900 to enter the ranks of the profession with an American training, and to follow the still earlier and smaller group of pioneer leaders. Upon them was to fall the major part of the task of establishing on firm foundations the great and ever-growing superstructure of forestry in the United States.

Forestry is too new a thing in the United States to have developed a substantial retired list. But the men who came from the forestry schools during the first decade of the century are today the veterans. The present outlook strongly suggests that forestry may be moving forward into a fresh period of rapid expansion and new adjustments. If so, the year 1933 is likely to stand as a landmark, signalizing the transition from the cycle of the first third of the century to a mid-century larger place in the national life. In the nature of things, it will be a period of changing leadership as the foresters of the second generation take over the rôles which their predecessors have hitherto filled. Of the latter many, it can be hoped and expected, will remain long on the stage; but the period which is peculiarly theirs is at an end.

To Major Stuart fortune assigned the rôle of leadership of the Forest Service during a half-decade when little progress could be made—a hard period of struggle against checks and restraints of many kinds. He fought vigorously and steadfastly to move towards new positions, and to organize the forces at his disposal for their most effective employment; he was given the welcome opportunity to see the way suddenly open ahead; but he was not privileged to go on into the land of fulfillment of his hopes. By his untimely death his record was closed at the turning point—if the future confirms that it is the turning point—when the cycle inaugurated with the advent of Gifford Pinchot had swung through its full course.

One of the striking evidences of Mr. Pinchot's early success in awakening the interest of the Nation in forestry matters was the number and the quality of young men who, as soon as technical schools for training foresters were established, turned to the new profession. For it was a profession with a wholly unpredictable future; those who entered it did so on faith. Compared with the numbers of the students preparing for other professions, of course, the embryo foresters were few indeed, in the nature of the case. The major appeal was to men with a readiness for adventure, a bent toward an outdoor life, and zeal for public service. That the result was to bring into the schools a highly

selected group of men is evidenced by reading the rolls of the early classes, thickly studded with names familiar to every forester.

Stuart's class was the fifth to emerge from the Yale School of Forestry. The Forest Service had been formed less than a year and a half before. Stuart had had a month's temporary employment in it, as "Forest Student," in the early fall of 1905. On July 2, 1906, he was appointed a Forest Assistant and sent to Montana, with assignment to the Hell Gate National Forest, under Supervisor E. A. Sherman.

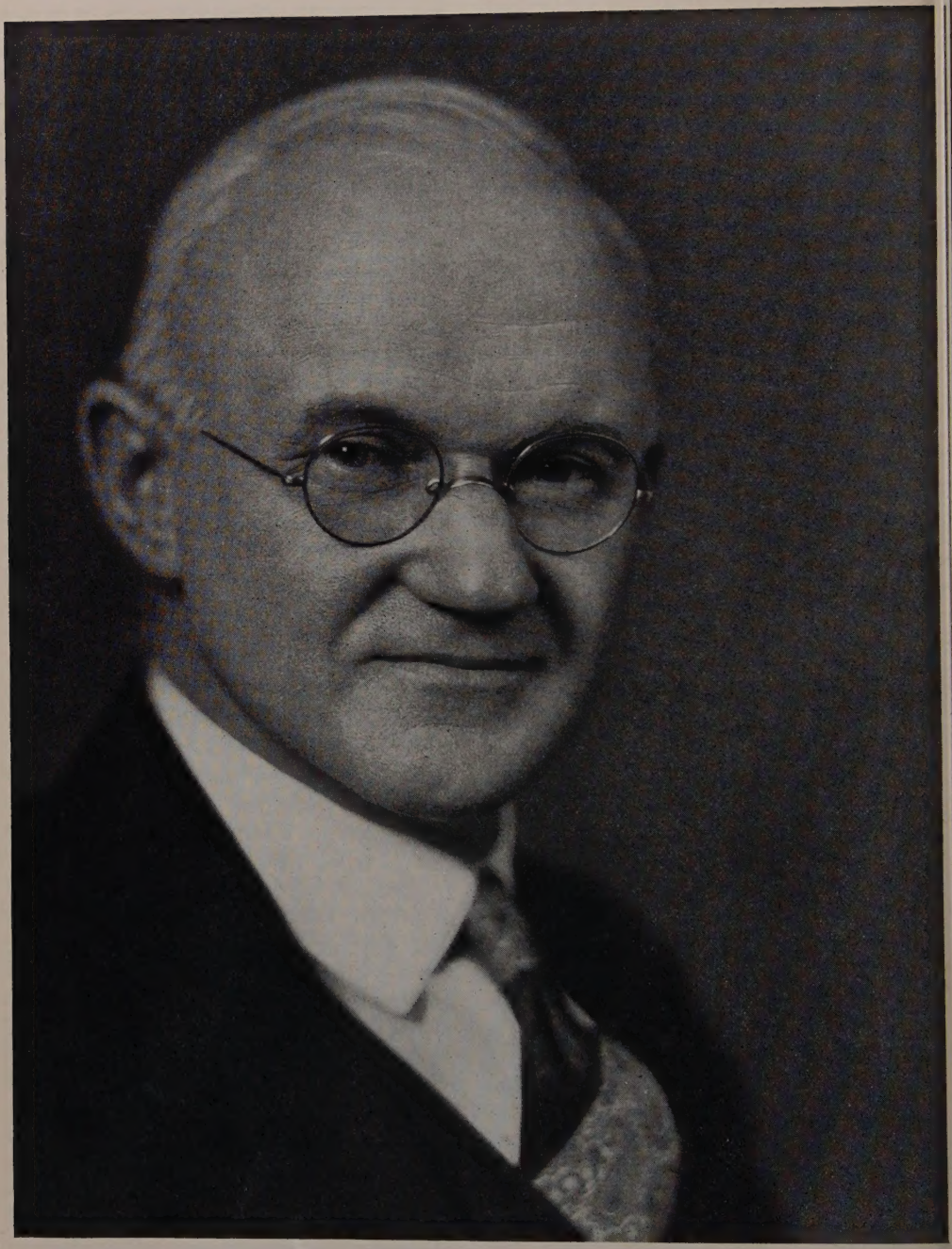
After two years of timber-sale work, mainly on the Hell Gate, Stuart was promoted, July 6, 1908, to the grade of Inspector and attached to the inspection district headquarters at Missoula, Mont., with Sherman then its chief. On December 1 of the same year, when the Forest Service reorganization that converted the six western inspection districts into executive districts went into effect, Stuart became Assistant Chief of Operation in District 1. His promotion to Assistant District Forester in charge of Operation in the same District took place January 1, 1910. This rise in three and one-half years to a position which at the present time would not normally be filled by a man with less than 15 years of administrative experience was not an exceptional rate of promotion for capable men in that formative period. Directly above him were District Forester Greeley and Associate District Forester Silcox—who in 1911 succeeded Greeley.

On November 1, 1912, Stuart was transferred to the Washington office of the Forest Service and promoted to the second place in the Branch of Silviculture, acting as inspector under Branch Chief Greeley. There followed participation in four and one-half years of steady upbuilding of technical standards and administrative efficiency in the national forest timber-sales work. In the spring of 1917 came the entrance of the United States into the World War; and Stuart sought and was accorded military leave, to take a captain's commission in the 10th (Forest) Engineers. He was overseas from September, 1917, to June, 1919.

Upon his arrival in France he was assigned to headquarters of the American Expeditionary Force, to assist in the acquisition of timber for the operations of the 10th and 20th Engineers—the two forest regiments. He was promoted to Major October 1, 1918, with assignment to general headquarters at Chaumont to assist in cordwood acquisition for the advance section. On February 19, 1919, he became commanding officer of the 5th Battalion of the 20th (Forest) Engineers and district commander of the forest troops in the Gien District. For his services with the American Expeditionary Force he received a citation from General Pershing.

He returned to the Forest Service July 19, 1919, but resigned May 15, 1920, to accept the position of Deputy Commissioner of Forestry in Pennsylvania, under Gifford Pinchot as Commissioner. This was Pinchot's personal selection for his right-hand man on assuming the commissionership. Major Stuart succeeded to the office in 1922, following Pinchot's resignation to stand for Governor. On June 15, 1923, after Pinchot's election the previous November, Stuart was elevated to the newly created position of Secretary of Forests and Waters. This placed him in the Governor's cabinet and gave him one of the leading assignments in Pinchot's first administration of the affairs of the State of Pennsylvania. Among the varied duties which thus fell to him were service as a member of the Tri-State Delaware River Treaty Commission, from 1923 to 1927, and as Chairman of the Pennsylvania Sesquicentennial Committee in charge of the commemorative Exposition of 1926.

Upon the expiration of Governor Pin-



Robert Young Stuart

1883-1933

chot's term of office Major Stuart reentered the United States Forest Service, February 16, 1927, as Assistant Forester in charge of the Branch of Public Relations. Including as this Branch does the conduct of coöperation with the states, the new position brought him into close touch with the public problems of forestry in all parts of the country, and not least in the Eastern States. These problems were carefully studied; at the same time the relations between the Service and state forestry agencies were strengthened and made more sympathetic than perhaps ever before. Upon the resignation of Colonel Greeley as Forester and Chief of the Forest Service, May 1, 1928, Major Stuart was chosen to take the vacated place.

In appointing him, Secretary of Agriculture Jardine acted upon the advice of Colonel Greeley, who had picked his successor just as he had himself been picked for the place by Colonel Graves on his retirement. The Forest Service is proud of its ability to develop competent leadership; and there was no question of the competence of the new Forester or of the wisdom of the succession. But the task assumed was one of manifest difficulties and perplexities; and these were not to grow less as the years passed. The Forest Service was strong internally, and under Major Stuart has made steady progress as an organization keyed up to render public service of a high order. Externally, however, the conditions were exceedingly unfavorable for pushing forward comparably with the forestry needs of the country.

The pressure for retrenchment in expenditures; the demand for curtailment rather than expansion of all forms of governmental activity, and especially of federal activities; the determined insistence on the superior capacity of state and local agencies, as against a central agency, to take care of the public welfare; the exaltation of business individualism, and the ascendancy of the counsels of the spokesmen for business in the shaping of public policies; the constant harping on the dangers and the ineptitudes of "bureaucracy"—all these were symptoms both of a state of the public mind and of a governmental attitude highly unsympathetic with advocacy of a vigorous course of action. The plain fact of the matter is that during most of the five years that Stuart was Chief of the Forest Service he had in large measure to spend himself battling against obstacles and adverse forces.

Some of the obstacles were due to the constantly growing complexity and cumbersomeness of the governmental machinery which has to be worked to get anything done. For a number of years there has been a conspicuous trend in the federal establishment towards setting up centralized checks and controls of various kinds, which act as a ball and chain on executive performance through divisions of authority, diffusions of responsibility, slowed-down action, and costly waste of effort. The burden of inertia thus imposed not only hampers effective performance—more disheartening than hostility or open opposition—but also depresses the spirit. When all the circumstances are impartially weighed, the degree of progress actually made in developing public policies of forestry and in enlarging programs and performances during Major Stuart's five years calls for admiration.

All in all his leadership of the Forest Service was a leadership of poise, vision, and competence. Without leting himself become swamped in detail, he kept himself acquainted with all that he needed to know in order to guide and decide properly. Never hurried, he was conspicuously accessible and prepared to consider promptly, carefully, and thoroughly whatever needed his attention. His powers of work were very great, his mind open, his judgment level, his de-

cisions clear-cut, his will unvacillating. He commanded in full the respect, trust, and loyalty of those under him, and was able to unite them in effective term work.

The Forest Service is not a machine which requires a driving power from without in order to operate, but has a life of its own. It was definitely a part of Major Stuart's policy, as its head, to foster the spirit of initiative and self-development which, for want of a better term, goes by the somewhat misleading name of "Forest Service democracy." Its essence is coöperation for a common end, plus an insatiate quest of new and better ways. As an organization the Forest Service unquestionably is stronger, more close-knit, and more efficient in its functioning than it was a half-decade ago; and for this the quality of its leadership, always sympathetic and encouraging but with no lack of firm control, must be given no small portion of credit.

In succeeding to Colonel Greeley's position as Forester Major Stuart fell heir to membership on the National Capital Park and Planning Commission, on which he served continuously to the time of his death, with deep interest in its work. He also succeeded Greeley as chairman of the Forest Protection Board, made up of representatives of the various federal bureaus directly or indirectly concerned in the protection of federal timbered lands and designed to bring about a better coördination of protective activities for these lands. He gave freely of his time to the service, in various capacities, of the Society of American Foresters, of which he became a member in 1911 and a fellow member in 1930; in 1927 he was its President. He was a member of the Masonic order, and of the college fraternity of Phi Delta Theta.

He was married December 9, 1907, to Janet M. A. Wolson, of Harrisburg, Pa., who survives him, with their two children, Janet Crichton, born July 19, 1920, and Helen Roberta, born January 22, 1924. His body lies in the Stuart burial plot at Carlisle, Pa., where each generation of the family from the time of the Revolution is represented. On the maternal side the family history in Pennsylvania spans two full centuries.

CONFERENCE ON ARTICLE X

By FRANKLIN REED

Executive Secretary, Society of American Foresters

THE first session of the conference between the Secretary of Agriculture and the lumber and timber products industry on Article X of the Lumber Code, took place on October 24-26, in the Department of Commerce Building in Washington. Since its purpose was to write into a practical program of action the principles embodied in Article X, the keynote of the meeting was action rather than oratory. It was a business meeting to devise practical and business-like forest practices to be applied in the management of privately owned forest land which would later become a part of the law of the land as a supplement to the Lumber Code. Another fundamental principle adopted at the beginning of the session was that no proposal how to accomplish this end whether it be submitted by an association or an individual, would be definitely disapproved or killed either in a committee or on the floor but would remain before the conference until the end of its final session in December.

There were 94 official delegates as follows:

Industry Conferees

LUMBER AND TIMBER

*S. R. Black	California Forest Protective Association
J. W. Blodgett	Blodgett Companies, Grand Rapids, Mich.
C. A. Bruce	Executive Officer, Lumber Code Authority, Washington
John M. Bush	Cleveland Cliffs Iron Company, Negaunee, Mich.
P. R. Camp	Camp Manufacturing Company, Franklin, Va.
*C. S. Chapman	Weyerhaeuser Timber Company, Tacoma, Wash.
R. A. Colgan	Diamond Match Company, Chico, Calif.
Wilson Compton	National Lumber Mfrs. Assn., Washington, D. C.
L. O. Crosby	President, Southern Pine Assn., New Orleans, La.
D. T. Cushing	Great Southern Lumber Co., Bogalusa, La.
Geo. L. Drake	West Coast Lumbermen's Assn., Seattle, Wash.
P. V. Eames	Shevlin, Carpenter & Clarke Co., Minneapolis, Minn.
Jerome J. Farrell	Northeastern Lumber Mfrs. Assn., New York, N. Y.
*W. B. Greeley	Mgr., West Coast Lumbermen's Assn., Seattle, Wash.
Charles Green	Eastman-Gardiner Lumber Co., Laurel, Miss.
C. L. Hamilton	General Timber Service, St. Paul, Minn.
*Henry Hardtner	Urania Lumber Company, Urania, La.
H. C. Hornby	Northwest Paper Company, Cloquet, Minn.
Joseph Irving	West Coast Lumbermen's Assn., Everett, Wash.
G. F. Jewett	Potlatch Forests, Inc., Coeur d'Alene, Idaho
*C. R. Johnson	Union Lumber Company, San Francisco, Calif.
B. W. Lakin	Western Pine Association, Portland, Oregon
*D. T. Mason	Mgr., Western Pine Assn., Portland, Ore.
J. G. McNary	Cady Lumber Corp., McNary, Arizona.
W. M. Ritter	W. M. Ritter Lumber Company, Columbus, Ohio
C. C. Sheppard	Louisiana Central Lumber Co., Clarks, La., and President, National Lumber Mfrs. Association

J. D. Tennant	Long-Bell Lumber Company, Longview, Wash.
A. R. Watzek	Crossett Western Company, Portland, Oregon
J. W. Watzek, Jr.	Crossett Watzek Gates Interests, Chicago, Ill.
R. M. Weyerhaeuser	Weyerhaeuser Timber Company

PULP AND PAPER

S. B. Copeland	Eastern Manufacturing Co., Bangor, Maine
D. C. Everest	Marathon Paper Company, Rothchild, Wisc.
John H. Hinman	International Paper Co., New York, N. Y
*R. S. Kellogg	Association of Newsprint Mfrs., New York, N. Y.
R. B. Robertson	Champion Fiber Company, Canton, North Carolina

NAVAL STORES

*R. E. Benedict	Brunswick Peninsula Company, Brunswick, Ga.

FORESTRY ADVISERS

*E. T. Allen	Portland, Ore., Forestry Counsel, Natl. Lbr. Mfrs. Assn.
*Chas. W. Boyce	American Paper & Pulp Assn., New York, N. Y.
*W. L. Hall	Hot Springs, Arkansas, Consulting Forester
*Edward R. Linn	Appalachian Hardwood Manufacturers, Inc.
A. G. T. Moore	Manager, Dept. of Conservation, Southern Pine Assn., New Orleans, La.
*A. B. Recknagel	Professor of Forestry, Cornell University, Ithaca, N. Y.
*J. W. Sewell	Consulting Forester, Bangor, Maine
*O. T. Swan	Sec.-Mgr., Northern Hemlock & Hardwood Mfrs. Assn., Oshkosh, Wis.

Public Conferees

AGRICULTURE

National Grange	L. J. Taber Fred Brenckman
American Farm Bureau Federation	Edward A. O'Neal Chester Gray
Farmers Union	John Simpson

PUBLIC AND PROFESSIONAL

U. S. Chamber of Commerce	T. G. Woolford, Atlanta, Ga. W. DuB. Brookings
American Forestry Association	*S. T. Dana, Dean, Forestry School, University of Michigan *H. A. Reynolds *Ovid M. Butler, Washington *G. H. Collingwood, Washington R. B. Goodman, Marinette, Wis. *P. W. Ayres, Boston, Mass. J. Hyde Pratt
Society of American Foresters	*C. M. Granger, Washington *Ward Shepard, Washington *Franklin Reed, Washington
American Tree Association	Arthur N. Pack, Princeton, N. J. *Tom Gill, Washington

	CONFEREES	ADVISERS
Forest Service	*Raphael Zon	*Austin Cary
	*E. I. Kotok	*W. N. Sparhawk
	*S. B. Show	*R. D. Garver
	*Burt P. Kirkland	*E. N. Munns
	*R. E. Marsh	F. R. Fairchild
	*Fred Morrell	*I. F. Eldredge
	*E. E. Carter	
	*L. F. Kneipp	
	*C. P. Winslow	
	*Thornton T. Munger	
	*Earle H. Clapp	
State Foresters		*W. G. Howard, New York
		*E. O. Siecke, Texas
		*H. L. Baker, Florida
		G. R. Hogarth, Michigan
		*G. M. Conzet, Minnesota
Indian Forest Service		*Robert Marshall
Agricultural Extension Service		*W. K. Williams, Washington, D. C.
		*R. W. Graeber, North Carolina
		*K. E. Barraclough, New Hampshire
		*D. E. Lauderburn, Mississippi
National Recovery Administration		E. A. Selfridge
Public Works Administration (Reforestation loans)		*Verne Rhoades
Department of Commerce		*Axel H. Oxholm

It is a matter of professional gratification to note that of these 94 official conferees and advisors, 49 (those marked with an asterisk) are professional foresters and members of the Society of American Foresters. Two others are associate members. Of these 49, 16 represent the U. S. Forest Service; 13 represent forest industry and private forest ownership; 3 represent other federal departments; 4, the state foresters; 4, the farm woodlot owners and 9 (including the three Society delegates) the general public. There was no sharp dividing line, with all industry on one side, and all forestry on the other. Professional foresters intermingled all through, and had as much to do with helping the industry make its preparations for the conference and prepare its proposals as they had with helping the federal Forest Service and any of the other public agencies. The profession in truth took a leading and influential part in the whole conference.

On the first day the program was carried out as follows:

GENERAL CONFERENCE

9:30 Conference opened and addressed by the Secretary of Agriculture, followed by Vice-Chairman H. S. Graves, who announced scope and procedure of the initial conference.

10:00 General position and proposals of the lumber industry presented by Wilson Compton.

10:30 Supplementary emphasis or proposals by regional spokesmen, 15 minutes each.

The North	J. M. Bush
The Northeast	J. E. Johnston
Western Pine	D. T. Mason
West Coast	W. B. Greeley
California	S. R. Black
The South	Henry Hardtner

AFTERNOON SESSION

2:00	(Supplementary emphasis or proposals continued)	
	The Hardwood Industry—C. A. Bruce	15 minutes
2:20	Position of the Pulp Industry—S. B. Copeland	15 minutes
2:40	Position of Naval Stores—R. E. Benedict	15 minutes
3:00	Public Considerations or Supplementary Proposals E. A. Sherman Acting Forester, U. S. F. S.	30 minutes
3:35	Supplementary emphasis or proposals by	
	state foresters	15 minutes
	Other public agencies	15 minutes
4:10	The Farm Woodland Problem—L. T. Taber	15 minutes
4:25	Forest Taxation Problem	
	G. F. Jewett	20 minutes
	Questions	15 minutes

The official statement of the Society of American Foresters, as presented by President Granger, is given herewith:

"Two years ago the Society of American Foresters adopted a set of principles of forest policy for the United States. A copy of the Society's platform is attached hereto.

"With respect to the public and private responsibility for forest practice on private forest lands, the Society's statement says:

'1. The industrial and general welfare of the country requires a direct participation of the public in the protection, development, and continuance of the forests.

'2. There rests upon private owners an obligation to handle their forests in such a manner as to prevent the public injuries which follow destructive exploitation and failure in fire protection.

'3. The public interest requires that private forests be protected from destruction. The public must therefore take the lead in offering every legitimate encouragement and assistance to private owners in removing controllable obstacles to private forestry.

'4. The public has the responsibility to exercise such control over the exploitation of private forests as may be necessary to prevent injury to the community at large.'

"The statement further advocates that:

"(a) Control measures should as far as possible be developed locally by joint public and private action.

"(b) Beyond a general restriction against clear cutting, without satisfactory provision for restocking, there shall be a minimum of prescriptive rules and a maximum of freedom on the part of the owner to work out his own methods to assure reproduction.

"(c) Control measures shall give full weight to economic conditions and handicaps, and shall be applied reasonably and progressively, beginning with practices most easily susceptible of remedy and with remedies that are least onerous or most advantageous to the owner.

"(d) The executive branch of the federal government should coöperate financially and in an advisory way with the states in devising and executing regulatory measures.

"(e) The responsibilities of the fed-

eral government in the field of public control should be carried out through the Forest Service.

"The Society of American Foresters congratulates the lumber and timber products industries on the obligation they have assumed, in coöperation with state and federal authorities, to initiate and administer the measures necessary for the sustained production of forest resources. It will applaud a successful demonstration that America can produce private forestry in this manner. It believes that the details of this undertaking should be worked out around the table between the forest industries and the proper governmental agencies, state and federal. It believes that the occasion calls for a program of prompt and specific action in which the word 'will' will supplant the word 'should'.

"The Society is ready to help in any way it can. In its relations with private and public agencies, it will feel free to question, suggest or criticize, confident that its intent will always be understood to be helpful and impartial.

(signed) C. M. Granger
Ward Shepard
Franklin Reed"

At the end of this first day's session, the chairman appointed the following committees:

I. Committee on Forest Practice. — C. C. Sheppard, Chairman; C. S. Chapman, Secretary; B. W. Lakin, D. T. Cushing, H. C. Hornby, Raphael Zon, W. M. Ritter (Linn), B. P. Kirkland, E. I. Kotok, I. F. Eldredge, J. J. Farrell, P. R. Camp, S. B. Copeland, R. A. Colgan, Ward Shepard, J. W. Sewell, Tom Gill, R. D. Garver, E. N. Munns, E. O. Siecke.

II. Committee on Public Timber Disposal; Public Acquisition. — O. M. Butler, Chairman; L. F. Kneipp, Secretary; D. T. Mason, J. W. Blodgett, J. G. McNary, W. B. Greeley, J. D. Tennant, R. E. Danaher, P. W. Ayers, J. W. Watzek, R. M. Weyerhaeuser (Marshall), Robert Marshall, S. B. Show, A. N. Pack, E. E. Carter, R. S. Kellogg.

III. Committee on Taxation; Forest Credits. — George F. Jewett, Chairman; A. G. T. Moore, Secretary; R. B. Goodman, J. M. Bush, S. R. Black, R. E. Marsh, T. G. Woolford, F. R. Fairchild, Verne Rhoades, B. P. Kirkland, D. C. Everest, H. E. Hardtner, R. E. Benedict, J. H. Pratt, C. M. Granger, R. C. Hall, S. T. Dana, W. N. Sparhawk.

IV. Committee on Public Coöperative Expenditures. — W. G. Howard, Chairman; Franklin Reed, Secretary; L. O. Crosby, S. R. Black, R. B. Robertson, E. O. Siecke, R. B. Goodman, Axel Oxholm, John Hinman, Fred Morrell, H. L. Baker, C. P. Winslow, G. R. Hogarth, G. M. Conzet.

V. Committee on Farm Timberlands.— John Simpson, Chairman; A. B. Recknagel, Secretary; R. W. Graeber, H. C. Hornby (Marshall), P. R. Camp, K. E. Barraclough, D. C. Everest, H. A. Reynolds, J. J. Farrell, G. H. Collingwood, Chester Gray, W. K. Williams, Fred Brenckman, D. E. Lauderburn.

VI. Committee on Emergency Timber Salvage. — A. R. Watzek, Chairman; T. T. Munger, Secretary; J. W. Blodgett, W. B. Greeley, L. O. Crosby, W. M. Ritter, C. M. Granger, J. J. Farrell, Axel Oxholm, Charles Greene, R. E. Benedict.

The second day was devoted to topic sessions presided over by the 6 committee chairmen in the order listed above, during which the proposals already submitted on the first day and additional ones were heard and discussed.

Beginning with the evening of October 25, the 6 committees went into executive session, continuing until noon, October 26, to consider all of the proposals within their respective fields which had been submitted and to prepare committee reports and recommendations which were presented at the continuation of the general meeting on the afternoon of October

26. An executive or steering committee was elected to carry on the work during the interim prior to the December session composed of the following: H. S. Graves, Chairman; Franklin Reed, Ovid M. Butler, Earle H. Clapp, Wilson Compton, Charles W. Boyce, Chester Gray, Fred Brenckman and G. F. Jewett.

A report on the October session of the Conference has been prepared under the supervision of the Executive Committee and sent out to the Divisional Code Authorities. A limited supply is in the hands of the U. S. Forest Service for distribution to other interested organizations and individuals. The report contains:

1. Statement of Secretary of Agriculture at opening session of the Conference.
2. Statement by Wilson Compton presenting industry proposals.
3. Statement by E. A. Sherman presenting Forest Service proposals.
4. Reports of the 6 committees, including all proposals submitted to and considered by them, and certain accompanying statements.

The action requested of the Divisional Code Authorities is:

(a) Immediate formation of such divisional or regional committees as may be necessary to give appropriate consideration to the proposals.

(b) Review of Conference proposals with recommendations for approval, modification or rejection. Consideration of any new proposals that may be important from the viewpoint of the region.

(c) Development of regional plan for "forest conservation and sustained production."

(d) Reports to the Conference from the Divisional Code Authorities to be in on or before December 4.

Further action expected of the committees and plans for the next session of the Conference are:

The Conference as now organized will continue in recess until January. The Executive Committee and the 6 Conference Committees will continue to function during the interim. On December 4, a study will be begun, under the Executive Committee, of the reports from the Divisional Code Authorities. The 6 Conference Committees will reassemble on December 11 to take the divisional reports under advisement and to formulate final Committee recommendations. The Conference will re-convene for its second session about January 24[1] to consider the final reports of its Committees. It will submit its final conclusions and recommendations, as provided in Article X, in two parts:

1. On public action, to the President, through the Secretary of Agriculture.
2. On industry action, to the Lumber Code Authority.

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[1]December 14 and 15, were the dates originally set for the second session of the conference, with the requirement that the reports from the divisional code authorities be in Washington on or before December 4. They, however, were finding it so difficult, in fact impossible, to complete these reports within that time that it was agreed upon by Wilson Compton, representing the industry, and Earle Clapp, representing the Department of Agriculture, to defer the date until after January 20. The exact date has not yet been set but will probably be about January 24 or 25.

OPERATION OF THE N. R. A. LUMBER CODE IN THE LAKE STATES[1]

By D. M. MATTHEWS

Professor of Forest Management, University of Michigan

This paper was prepared some time prior to the October 24-26 Conference on Article X of the Lumber Code. In it an attempt is made to show how the operation of the Code may affect a typical large scale hardwood and hemlock logging and milling enterprise in the Lake States. The restrictions which the Code will probably place upon output and the effect that such restrictions may have on both financial and technical aspects of lumbering in this region are points to which particular attention is paid. It is believed that Article VIII of the Code, which outlines the method whereby production allotments shall be made to each operator, can be considered as complementary to Article X which provides that, "The applicant industries undertake . . . to carry out such practicable measures as may be necessary . . . in respect of conservation and sustained production of forest resources." Intelligent compliance with the provisions of Article VIII will it is reasoned, in all probability, satisfactorily meet the requirements of Article X.

As would be expected from the declared intentions of the National Industrial Recovery Act, the text of the Code clearly indicates that one of the major results hoped for from its operation is a rise in the price of lumber products which will permit the resumption of wage scales approximating those paid in the lumber industry during the years 1924 to 1929. Therefore price and cost data used in the following illustration have been taken from U.S.D.A. Technical Bulletin No. 164, entitled "Selective Logging in the Northern Hardwoods of the Lake States." This bulletin was published January 1, 1930, but the data appearing therein were collected some time prior to that date—presumably during 1927 or 1928. They are out of line with present costs and values but they are unquestionably the best data available and it is to be hoped that the operation of the Code may cause them to be again currently accurate.

Assumptions Upon Which the Illustrative Case is Based

1. A timber property of 40,000 acres carrying an average stand per acre of 10 M board feet— therefore total stand 400,000 M.

2. Species distribution—75 per cent maple, 15 per cent birch, and 10 per cent hemlock. Volume distribution through the diameter classes as per Table 2.

3. Annual cut of company prior to 1929 —20,000 M. (3-year average).

4. Total cut for region for same years —2,050,000 M.

5. Average hourly production for company—6.66 M. (3-year average).

6. Comparable total hourly production for region 600 M.

7. Average number of employees with company for same period—400.

8. Total number of employees for region—39,000. (same period).

9. Average taxes paid currently by company—$25,000 per year.

10. Average taxes paid currently in region—$2,450,000 per year.

11. Reserve standing timber in region —36,000,000 M.

12. Quota established for region by the Lumber Code Authority—1,000,000 M board feet per year.

[1]Unrevised paper presented at the Michigan Land Utilization Conference of Timberland Owners, October 20, 21, 1933. Ann Arbor, Michigan.

Determination of Production Allotment for the Company

According to the provisions of Article VIII, sections (a) to (e), that fraction of the 1,000,000 M feet production quota assigned to the region which would be allotted to the company is determined as follows: Ratio of hourly production to total

$$\text{hourly production } \frac{6.66\text{ M}}{600\text{ M}} = .0111.$$

The relative proportion of this factor in the determination of the allotment is 40 per cent. Therefore: 40 per cent of .0111 allowed for this ratio ..... .00444

Ratio of yearly production to total yearly production:

$$\frac{20{,}000\text{ M}}{2{,}050{,}000\text{ M}} = .009755.$$

Relative proportion 30 per cent. Therefore 30 per cent of .009755 allowed for this factor ..... .00293

Ratio of average number of employees:

$$\frac{400}{39{,}000} = .01027.$$

Relative proportion 15 per cent. Therefore: 15 per cent of .01027 allowed for this factor ..... .0015

Ratio of average taxes:

$$\frac{\$25{,}000}{\$2{,}450{,}000} = .0102.$$

Relative proportion 5 per cent. Therefore: 5 per cent of .0102 allowed for this factor ..... .0005

Ratio of amount of standing timber: $\frac{400{,}000\text{ M}}{36{,}000{,}000\text{ M}} = .01112.$

Relative proportion 10 per cent. Therefore: 10 per cent of .01112 allowed for this factor ..... .0011

Total proportion of quota allotted to company ..... .01053

As the production quota assumed for the region is 1,000,000 M board feet the production allotment for this company would be 1,000,000 M x .01053, or 10,530 M board feet per year.

Financial Results of Unrestricted Destructive Logging—Annual Cut 20,000 M

The fixed investment and depreciation sheet for such an operation has been calculated in Table 1.

Table 1

FIXED INVESTMENT AND DEPRECIATION SHEET
PLANT AND EQUIPMENT TO LOG AND MILL
400,000 M FEET FROM 40,000 ACRES IN 20 YEARS

Equipment or plant item	Initial cost	Years in use	Average an. dep.	Fixed investment
R. R. main line, grade and ties, 20 miles	$100,000	20	$5,000	$52,500
Steel for main line	60,000	20	3,000	31,500
Spurs, 10 miles per year at $2,000		1	20,000	20,000
Steel, 1 year's supply on hand	30,000	5	7,500	18,750
R. R. equipment $60,000, average life 10 years	120,000	10	6,000	33,000
Logging camp construction	148,000	3	7,400	14,800
Logging roads, 20 miles per year			7,000	7,000
Mill, town, etc.	500,000	20	25,000	262,500
			$80,900	$440,050
Working capital $\frac{\$23.87}{4}$ x 20,000 M				119,400
				$559,450

Costs of depreciation on permanent improvements and equipment have been calculated from the above sheet. Direct costs of operation such as log making, skidding, railroad operation, etc., and overhead items such as general expense and supervision have been taken from data appearing in Technical Bulletin No. 164. The sale value of dry lumber produced from trees of various diameters has also been taken from the above bulletin. From the production costs and lumber values as thus calculated it has been possible to prepare a stand, stock, and value table for the area which indicates the average distribution of the timber by volume through the diameter classes and the extent to which each diameter group contributes to the surplus available from operation to pay for stumpage, taxes, and profit.

Attention is directed to the fact that the most satisfactory financial results cannot be expected from destructive logging which aims to remove all trees which have any merchantable content whatever. From the above table it would appear that the best financial results would follow upon taking timber down to a limit of about 14 inches in diameter only. It also shows that a limit of 18 or 19 inches, which would leave a fairly well stocked young forest on the area and undoubtedly meet the requirements of Article X of the Code, would nevertheless realize most of the positive value represented by a timber stand of this character.

The financial results of complete destructive logging are best shown by the preparation of an annual income sheet (Table 3).

Financial Results of a Continued Policy of Destructive Logging Under an Allotment Calling for an Annual Cut of 10,530 M

If such a policy were continued the area cut over annually would be reduced from 2,000 acres to about 1,000 acres and the life of the operation would presumably be extended to 40 years. In this event all of the items of annual depreciation appearing in the investment sheet for a 20-year operation would be reduced.

Table 2

STAND, STOCK, AND VALUE TABLE FOR AREA REPRESENTATIVE ACRE

Approximate age of timber years	Diameter in inches	No. of trees	Volume in bd. ft. mill tally	Sale val. of lumber minus production cost per M	Surplus per age-group avail. to pay for stumpage, taxes, and profit
0- 20	Small trees below 4″ in dia.				
21- 40					
41- 60	4- 8	44	nil	nil	
61- 80	9-11	17	590	—5.30	—3.73
81-100	12-14	12	1,110	—1.50	—1.67
101-120	14-16	9	1,460	+3.36	4.90
121-140	16-18	8	1,625	7.14	11.60
141-160	19-22	6	2,340	12.95	30.30
Overmature timber	23 plus	8	2,875	17.65	50.70
Total		104	10,000		92.10

Average value per M to 9″ limit—$9.21 per M.

To simplify the calculations involved in this illustrative case it will be assumed that they will all be reduced by 50 per cent, although it is doubtful if such drastic reductions could be effected or, in the case of the mill and town at least, would be allowed by good accounting practice. The costs of supervision and general expense would, of course, rise in proportion to the reduction of the annual cut. Taxes also, when expressed as a cost per thousand board feet of output, would rise. The annual income sheet as calculated for these conditions appears in Table 4.

As destructive logging to a 9-inch diameter limit would not leave a stand of timber on the ground which could be considered the result of "practicable measures. . . .necessary in respect of conservation and sustained production of forest resources," the requirements of Article X could only be met by planting up a cutting area of about 1,000 acres annually and maintaining such an increasing area of young plantations. The expenses of such an undertaking would probably more than absorb all of the above indicated surplus of approximatd $20,000 per year. Destructive loggi under the Code, for such a stand as here being considered, would appear be financially out of the question.

Financial Results of Selective Logging Under the Code

The technical objectives of selecti logging plans are not, as is so often a sumed, in conflict with the financial o jectives of a well-managed forest busine They are: (a) the maintenance of sati factory site conditions by keeping a co stant forest cover on the land; (b) th production and harvesting of high quali timber such as can only be produced c good sites and by the rapid growth whic results when trees are released from co petition by partial cuts at frequent inte vals; and (c) the insurance of continuou production of timber crops, by natura regeneration if possible, although plan ing or seeding may be resorted to necessary. These objectives, if attaine constitute the basis of successful financia

Table 3

ANNUAL INCOME SHEET

DESTRUCTIVE LOGGING TO A 9-INCH LIMIT—ANNUAL CUT 20,000 M

Gross income from sales—20,000 M @ $33.08		$661,60
Direct operating costs	$17.50 per M	
Supervision and general expense	2.33	
Depreciation and maintenance:		
Railroad construction and equipment	2.07	
Logging roads	0.35	
Logging camps	0.37	
Mill and town	1.25	
Total	$23.87	
Total annual production cost—20,000 M x $23.87		$477,40
Annual surplus available to pay for stumpage (depletion charge), taxes and profit		$184,20
Annual taxes	$25,000	
Depletion charge @ $3 per M	60,000	
Total		$85,00
Available for dividends		$99,20

management. Operations which log and mill only trees of the larger diameters show a large margin between direct costs and selling prices to carry fixed charges; and insurance of continuous production does away with the necessity for heavy depletion charges which so often cut dividends to the vanishing point.

If reference is made to Table I it will be seen that the bulk of the stand value per acre is concentrated in the oldest age-group and in the overmature timber, or in the trees 19 inches and up in diameter. If the cut is confined to these trees it will remove 5,215 board feet per acre which would represent 52.1 per cent of the merchantable volume and 83 per cent of the positive stand value. If the age estimates indicated may be considered reasonably accurate and if the operation is planned to log over 2,000 acres each year, such a plan of cutting would conform to a selective-logging plan operating on a 20-year cutting cycle and aiming at the establishment of a 160-year rotation. Successive cuts at 20-year intervals could be maintained and would be confined to timber about 160 years of age and averaging 20 inches in diameter or better. The volume of the yields in later cycles would not be as great as that obtained during the first cycle because the latter will be made up of timber which is in part now overmature. Conservative estimates of the rate of growth which would follow upon such partial cutting indicate that subsequent yields should be at least 3,500 board feet per acre every 20 years. The difference between the estimated volume of these future cuts and that of the cut taken during the first cycle, or about 1,700 board feet per acre, should be considered as depletion and so handled in the income sheet.

In Table 22 of Technical Bulletin No. 164 the total production cost per M for a cutting limit of 19 inches and up is given as $25.83. Of this total $13.61 is direct costs and $12.22 is accounted for by increased depreciation, general expense, and supervision charges which are induced by the reduction of output. These heavy indirect charges are based on the assumption that no change takes place in

TABLE 4

ANNUAL INCOME SHEET

DESTRUCTIVE LOGGING TO A 9-INCH LIMIT—ANNUAL CUT 10,530 M

Gross income from sales—10,530 M @ $33.08		$348,500
Direct operating costs	$17.50 per M	
Supervision and general expense	4.42	
Depreciation and maintenance:		
Railroad construction and equipment	1.97	
Logging roads	0.33	
Logging camps	0.35	
Mill and town	1.19	
Total	$25.76	
Total annual production cost—10,530 M x $25.76		$271,250
Annual gross surplus from operations		$77,250
Annual taxes	$25,000	
Depletion charge @ $3 per M	31,590	
Total		$56,590
Surplus available for dividends and to pay for such conservation measures as may be required by Article X of the Code		$20,660

the physical or financial set-up of the operation. Actually financial plans should recognize the fact that the operation under a sound selective plan of management would be permanent, and this recognition should be reflected in a lowering of certain fixed charges as expressed in costs per M feet of output. The main line and spur railway grades should be considered as permanent improvements in a real sense, and maintenance charges on account of these items should replace depreciation charges. In the income sheet (Table 5) an allowance of $5,000 per year for clearing out, and laying track on, old grades replaces the depreciation items for spurs and main line. The charge for supervision and general expense is set at the same figure as for destructive logging with the reduced cut, as is also the depreciation charge for the mill and for logging camps. That for logging roads is higher because the operation will cover 2,000 instead of 1,000 acres per year.

Financial Results During Later Cycles

In the second and subsequent cycles it would not be safe to count on a greate cut than 3,500 board feet per acre, or a annual cut of 7,000 M. Timber woul average 20 inches in diameter and bl worth $35.01 per M on the basis o values as given in Bulletin 164. Direc costs of logging would drop to $6.44 per M (Table 20, Bulletin 164) and o milling to $4.75 per M (Table 11, Bul letin 164), so that the total direct cost would be $11.21. Supervision costs an general expense items with this smalle cut would be higher and have been esti mated at $5.00 per M. Depreciation item would fall as to the total involved bu would rise as a cost per M. Depreciatio and maintenance items, on account o railway construction, have been estimate at $14,000 per year, logging roads a $3,000 per year, and camp construction at $3,000. Total mill depreciation has been assumed to be the same as pre viously and hence rises to $1.79 per M on the lower cut of 7,000 M.

On the basis of these estimates the income sheets for subsequent cycles would be about as given in Table 6.

Although total annual earnings would be considerably less during these subse-

Table 5

ANNUAL INCOME SHEET
PERMANENT OPERATION UNDER A SELECTIVE LOGGING PLAN—ANNUAL CUT 10,530 M

Gross income from sales—10,530 M @ $37.21		$392,000
Direct operating costs	$13.61 per M	
Supervision and general expense	4.42	
Depreciation and maintenance:		
Railroad construction and equipment	1.75	
Logging roads	0.66	
Logging camps	0.35	
Mill and town	1.19	
Total	$21.98	
Total annual production cost—10,530 M x $21.98		$231,600
Annual gross surplus from operations		$160,400
Annual taxes	$25,000	
Depletion @ $3 figured on 3,400 M feet	10,200	
Total		$35,200
Annual surplus available for dividends and to cover cost of formulation and administration of the selective logging plan of management		$125,200

quent cycles it must be remembered that the total investment would also be less. If the timber tract at the start of operations had a book value of $1,200,000 the total average investment, including plant and equipment, would have been, during the first cycle, about $1,700,000. As earnings, before allowing for the costs of forest management, are estimated at $125,200 per year, this represents a return of $\frac{\$125,200}{\$1,700,000}$, or 7.35 per cent on the total investment. During the first cycle the income sheet calls for annual depletion charges on timber of $10,200 and depreciation charges on the mill of $12,530 per year. This item of depreciation on the mill would not have to be reexpended in further mill equipment of the same character, as a plant to handle 7,000 M per year would be adequate in the future. The total of $22,750 thus released annually, if invested to earn interest at 4 per cent, would amount to $677,000 in 20 years, thus reducing the total investment to around $1,000,000. Income at the rate of $74,000 per year in later cycles would still represent a return of over 7 per cent on capital invested.

The Necessity for Forest Management Plans

As has been previously stated, the illustrative case which has been discussed above is based largely upon cost data collected at considerable expense by officials of the U. S. Forest Service. They have been interpreted in the light of certain definitely assumed conditions as to timber area and stand per acre. The results shown are therefore not applicable to any specific area but are indicative of the possibilities of forest management. They refer to a larger area than may be in any single ownership unit. The question may therefore arise as to what would be the financial results were a smaller area involved. It may be said with certainty that the results shown are indicative of the possibilities on smaller areas only when the average fixed investment in plant and equipment can be kept proportional to the investment in timber, and when supervision and general expense items can also be so reduced. There is a lower limit beyond which such reductions in plant and supervisory expenses cannot be carried. What this lower limit is, whether it goes with a 5,000, 10,000, or 20,000-acre area, is immaterial; it is evident that there must be many timber holdings which are not of sufficient size to organize independently for sustained yield production.

Three courses are open to owners of these smaller areas:

1. They can arrange to manage their

Table 6

Annual income sheet subsequent cycles

Gross income from sales—7,000 M @ $35.01		$245.070
Direct operating costs	$11.21 per M	
Supervision and general expense	5.00	
Depreciation and maintenance:		
Railroad construction and equipment	2.00	
Logging roads	0.43	
Logging camps	0.43	
Mill and town	1.79	
Total	$20.86	
Total annual production cost—7,000 M x $20.86		$146,020
Annual gross surplus from operations		$99,050
Annual taxes (if unchanged)		$25,000
Total		$74,050

areas so as to insure permanent production by selling stumpage or timber to larger sustained yield management units on long-time contracts, or

2. They can merge, one with another, to effect a consolidated ownership unit of a size sufficient to hold overhead expenses down within reasonable limits, or

3. They can cut selectively and later sell their property to larger management units or to the government.

Any one of these courses will call for a plan—a plan which outlines clearly the production budget aimed at and which estimates with reasonable accuracy costs of production and future yields. Such plans cannot be made—as I have made this one—from hypothetical data. The timber property must be examined as to stand and probable growth rates; transportation and manufacturing costs must be estimated on the ground, etc., etc. This will cost money, to be sure, but generally costs more money to go ahea without a plan.

It is suggested that timber owne would be well advised to avoid an specific commitments as to what will b required of them in the way of "sustaine yield management, silvicultural, protec tion, and other forestry measures." As a alternative, if they offer to prepare plan for the operation of their properties de signed to progress toward permanent pro duction, such plans to be submitted t competent authority for review and ap proval, they will in all probability be offering all that anyone could expect o them under the Code and, a the same time be doing themselves a service by meetin the requirements of the Code in a manne which will be flexible in operation an adjusted to the management condition presented by each individual property.

THE INDIANS AND THEIR LANDS

By JOHN COLLIER[1]

IN COLLABORATION WITH

WARD SHEPARD[2] AND ROBERT MARSHALL[3]

The Indian reservations and their millions of acres of forest have long been a subject of interest to professional foresters and our molders of American forest policy. Not a few members of our own Society of American Foresters have devoted their best years and their sincerest endeavor to the development of policies and prcatices that would bring about a sound system of management of the Indian forest properties. The ideals of the new administration in the Office of Indian Affairs, as set forth in this article, and the plans for realizing them should engage the earnest attention of every reader of the JOURNAL.

THE Indian forest problem is only one phase, though an extremely important one, of the whole Indian land problem. This land problem and its proposed solution will, we believe, appeal strongly to foresters, who, in one way or another, have been the advance guard in the larger phases of land management and conservation in the United States.

The chief clue to the evils that have beset the Indians for the past half century is to be found in the Allotment Law of 1887. This law—still, in 1933, unrepealed—was based on the theory of making the Indian into a responsible, independent, self-supporting American citizen by the over-simple expedient of mandatorily applying to him the individualistic land tenure of the nineteenth century white American. The results have proved again how dangerous it is to try to solve problems by theories not soundly based on the facts of life and nature.

For through the allotment system and its attendant evils the Indians have lost sixty-three million acres of their land, much of it the best, and are threatened with a loss of a large fraction of the remainder unless the allotment law is repealed. The manner of loss was simple —indeed, inevitable. When the allottee received his fee title to his allotment, he was more than likely to sell the land to a white man and live on the proceeds well, if not wisely, for a few months or years. Or if the original allottee had in the meantime died, it was necessary to divide the land among his heirs, and as often there were numerous heirs, the feasible way to do this was to sell the land and divide the proceeds. After the allotment law was put into effect, many of the socalled "surplus" lands were opened to homestead entry, on the theory that all the Indians had been provided for through individual allotments and there was no further need of land. This program, however, overlooked the important facts of the impending losses of the alloted lands and the possible increases in population.

The allotment law, coupled with the disposal of "surplus" lands, has deprived the Indians of almost two-thirds of all the lands remaining in their possession forty-six years ago. The Indian was not ready, in general, to assume the responsibility of unrestricted ownership, and in any event the allotment of forest and grazing lands has made intelligent management of these lands in many places difficult

[1]United States Commissioner of Indian Affairs.
[2]Special Advisor in Land and Forest Policies to Commissioner of Indian Affairs and Secretary of the Interior.
[3]Chief, Indian Forest Service.

or impossible. There are at present about seventeen million acres of allotted lands that are in various stages of the process of dispersal and loss to the Indian communities. Of these seventeen million acres, about seven million acres have reached the fatal "heirship" stage, and the next step under past procedure would be to sell these lands and divide the proceeds among the heirs. However, by administrative order we have stopped the further sale of heirship lands until the allotment law can be repealed or substantially modified.

Now the interesting thing about the allotment system is that it has signally failed to achieve its goal of turning the Indians into self-supporting, independent land owners. Instead, it has built up a large class of landless Indians. There are today, it is roughly estimated, between eighty thousand and ninety thousand landless Indians, most of whom are paupers or intermittant laborers, who have not been and for the most part cannot be inducted into industry, and who if they were inducted, would merely aggravate the problem of unemployment among the whites. The allotment system has deprived the Indians, in large measure, of their chief means of support without substituting any other means in its place, and so has progressively built up an enormous relief problem for the government which will become constantly worse if the vicious circle cannot be broken. Moreover, the allotment system has so shredded and mangled the Indian lands that remain, that it is in many places impossible to use them intelligently for the economic and community welfare of the Indians. Incidentally, the government spends millions each year in the fruitless work of administering the steadily diminishing Indian allotments.

The new Indian land policy starts with the assumption that the land is the great hope of the Indian. If he cannot be trained to be self-supporting in the prim tive and relatively simple arts of agr culture and grazing and in his ow natural environment, how can he l trained in the more sophisticated ar complex techniques of modern industr in great industrial centres? But it wi not be enough merely to stop the allo ment system. We must work in the o posite direction of reacquiring larg amounts of the lost lands and in son cases of acquiring additional lands fro other sources such as the public domai This program requires, first of all, consolidation of Indian lands and th restoration of many of these lands t tribal ownership through exchanges, d rect purchases, and relinquishments c allotments possibly in return for a lif interest in the use of communal property

It is clear that in the case of forest and grazing lands, tribal or communit use and ownership will in general be th most satisfactory system. The experienc of the U. S. Forest Service equally wit that of ancient communal land tenures i many European countries, as well as ou own disastrous experience with the un reserved and unmanaged public domai clearly indicate that community ownership *and management* of these types of lan for communal or social purposes is an eminently satisfactory solution both from the public and the private standpoints But even in the case of agricultural lands it is probable that tribal ownership, wit a system of assignment to individua users, or private ownership with some limitation on the right of division and subdivision beyond a minimum possibility of economic use, will in many or all reservations be essential to the right use of the Indian lands.

But no system of land tenure will in itself solve the Indian problem. The Indians themselves must have the knowl edge, the will, and the capital to operat their lands. We therefore look to a sys

tem of vocational education that will educate individual Indian land users in the technique of land use, and that will also qualify Indians to become forest managers, grazing managers, and agricultural managers. We belive that with proper professional training, there is no reason why Indians cannot become expert land managers and gradually take over the administration of their community forests, grazing ranges, and farm lands. We look to a systematic program of educating Indians as forest rangers, professional foresters and range managers, erosion experts, irrigation engineers, and general land managers and developers. The first step in this training program is being taken this winter in the setting up of four "Leader Training Camps" under the Indian branch of the Civilian Conservation Corps, in order to give about two hundred carefully chosen Indians elementary training in forestry, range management, and other phases of land use through the medium of "training on the job." We look also to the institution of a system of credit that will put the Indians on their feet, enable them to work their lands, and give them the advantages of modern technology. We look also to the setting up of tribal councils or public corporations of the municipal type, in order to move toward responsible self-government by the Indians and their group participation in the working out of their own destiny.

This program of giving to the Indians greater responsibility and a larger share in the management of their own affairs and their own property does not mean that they will be given an unrestricted and dangerous freedom. It is clear that for many years to come the Indians must be restricted in the rights of alienation and to some extent in the rights of use of their lands and natural resources. We must, for example, impose on the Indian forests, by congressional enactment, the principle that only the forest income may be used and the forest capital must be left unimpaired. This principle may one day become a guide to point the way to saving the forests of America.

It is interesting to trace how the special problems of Indian forestry have grown out of the allotment law and out of the now so largely discredited *laissez-faire* economic philosophy that has ridden our land wellnigh to ruin.

One of the reasons for the unsatisfactory progress of forestry as a whole in America has been the underlying conflict between forestry ideals and the prevalent economic ideals of the country. Forestry stands for the principles that today is of no more importance than tomorrow, that in harvesting trees now we must make sure that there will be just as good trees fifty years from now, that maximum present income must be sacrificed in order to assure a sustained life for the forests. The general American economic philosophy, on the contrary, has held that a bird in the hand is worth ninety in the bush, that the measurement of success is not the welfare of the future but the profit of the present, and that this present profit must be given prior consideration over anything else. There is simply no way of bringing together the spirit of "What will this mean to the welfare of our grandchildren?" and "What will this mean to me in dollars and cents?"

In addition to this general conflict between forestry and economics, the Office of Indian Affairs has been handicapped in the practice of forestry by several obstacles unique to its own problems. The first and most serious of these is the allotment system described above, against which the forestry personnel of the Indian Office has fought a splendid battle for many years. This system has resulted in dividing many of the Indian forests into separate ownerships of about 160 acres each. But forestry practice, particularly in the West, is obviously im-

possible where every 160 acres must be handled according to the wishes of a different owner. Until the allotment of timber to individual Indians was stopped, it was futile to plan any sustained yield operation. In fact, the only rational course was to sell the Indian timber to the highest bidder, practice such forestry as the allottees or buyers would tolerate, and get as much money as possible.

The necessity in some cases, the uncompelled policy in others, to sell the timber had several deleterious effects on the Indians. To begin with, on several reservations it got them into the habit of expecting an income without work, and this gave rise to the same unfortunate results which money without work always seems to have on people regardless of their race. They became by comparison with their former selves lazy and dissipated, and in many cases would not take good jobs even when they were available. Furthermore, to have their timber sold for them, instead of working it themselves, gave them a lack of confidence in their own ability to accomplish things. They were merely wards of the government, not independent citizens fighting out their own living.

Most of the conditions which in the past have worked against a self-sustaining forest industry among the Indians have now changed. The allotment of Indian lands is already stopped. The end of the years of easy, unearned income has made many tribes eager to undertake the operation of their own timber for the sake of wages if nothing else. Furthermore, the confidence of the Indians in their ability to handle matters has been greatly increased, especially during the past summer, owing to their successful prosecution of the Emergency Conservation Work program on their reservations.

As a result, it is hoped within the next year to begin on several reservations the development of Indian-conducted logging and milling operations such as have a ready begun at Menominee and Red Lak Wherever it is economically feasible th forest wealth will be sold no longer a standing timber or even as logs, but a finished lumber, and the Indians wi derive not merely the profit of stumpag but also wages. The profit will be divide equally among all members of the trib while the wages, as in white civilizatio will vary according to the position whic each man is capable of holding. All c the capital, including both the forest an the machinery necessary to develop i will be communally owned by the entir Indian nation.

It is hoped—dependent on grants c capital from Public Works or from Co gress—that within a year operations wil begin on most if not all of the follow ing reservations: Warm Springs, Klamath Colville, Spokane, Navajo, Yakima, Fla head, Tongue River, Mescalero and For Apache. The annual cut on these reserva tions at the start will range from abou two million feet to about fifteen millio feet, provided that the NRA quotas mak this possible. The operations will b almost entirely in ponderosa pine.

It is planned to use a light selectio method of cutting, removing on the aver age not more than fifty per cent of the volume of the stand. This, we believe will leave sufficient growing stock to make it profitable to return for at least one and perhaps several additional cuttings before the end of the rotation. With such light cuttings it should be possible to log in the briefest possible time the over-mature, flat crowned trees which are especially liable to insect damage. At the same time it should be possible to cut over the merchantable timber in a relatively brief period, and thus remove the over-mature trees in which insect damage is most serious. It is also believed that from both a fire protection and a silvicultural standpoint a light selection cutting is ideal.

In the development of the operations the great objective will be to hold down the investment as much as possible. Logging will be done by tractor and truck, and the high cost of railroad construction will be eliminated.

It is planned to operate entirely with portable and semi-portable mills cutting from two to four thousand feet an hour. These will be located right in the midst of the timber to be logged, and thus the great expense of long hauls will be eliminated. Furthermore, the initial investment will be slight compared with the investment in the customary type of heavy mill, and the charge for depreciation will be proportionately small.

Each operating unit will consist of a mill and the necessary logging to feed it. Such a unit should employ about thirty men for seven or eight months. The wages paid will be in conformity with the NRA code. At the start it will probably be necessary on most reservations to have a white manager, mill foreman, sawyer, filer, and salesmanager, though there are a few excellent Indian sawyers. All the other positions can generally be occupied by Indians. A few years of training, in most cases, should fit the Indians to hold the other positions. Of course there is a great difference in the adaptability and the interest of different tribes in woods work, and while some reservations may soon have an entirely Indian-manned operation, others may wait years before achieving this goal.

Through these tribal forest industries it should actually be possible to give all able-bodied men on the timbered reservations a permanent chance for work. On some reservations, indeed, there will be more positions than Indians to fill them and it will be necessary to employ white men or Indians from other reservations. Thus the Indians will develop a stable life, with a steady income which will give them the material necessities for happiness, instead of the old, sporadic income with its accompanying splurge. They will have work to do which will be interesting, which will develop skill, and in which they may rise from position to position, bringing with it the laudable satisfaction which successful accomplishment brings to most people. The operation will also bring to the Indians the power to manage their own affairs and the self-respect which such power insures. The government will be saved a share of the gratuities which it now donates in millions of dollars annually to the Indians because they have never been given the chance to support themselves. From a forestry standpoint, sustained yield management will be assured.

It is interesting to reflect on the reverses brought by time. Ever since Christopher Columbus discovered America the white race has been smugly certain that it has had a higher civilization than the Indians. More than one writer has pointed to the poor, benighted heathen who did not even know enough to divide their land into personal property. So certain were the white men of the advantage of private ownership of natural resources that they forced the Indians to follow their example by breaking up the reservations into allotments, and even in some cases led the Indians to demand allotments for themselves. Today the attitudes have changed, and the white race in general is coming to the conclusion that not only were the allotments a mistake, but that a large share of their own forests should be returned to community ownership. Some people are going even farther and contending that all timberland, except farm woodlots, should pass into public ownership. Thus after four centuries or more of scorn, there is slowly coming a realization that the Indians' method of forest ownership was perhaps after all better than that of the whites. Possibly the community operation of the

Indian forests may also point the way for another future development in the white civilization.

We are aware of the difficulties of bringing about these fundamental land, (including forest) reforms. But we have arrived at the stage where we can conclusively define the evils of the past system and can set up sound guiding principles based, this time, on the facts of life and nature. And within the framework we can set in motion large constructive forces opposite in direction fro and equal in momentum to the destructi forces of the past. The Emergency Co servation Work has strikingly shown t great latent powers of the Indians f intelligent and effective coöperative labo The Indians have in the past centu been ruinously wrought upon by a fa tastic economic policy. The solution the Indian "problem" now depends p marily on intelligent, permanent land us and on human understanding.

E. C. W. ON INDIAN RESERVATIONS

By J. P. KINNEY

THE Act of March 31, 1933, Public No. 5, known as the "Emergency Conservation Act" afforded an unparalleled opportunity for the improvement of forest and range conditions, on lands held in trust by the United States for the benefit of the Indians of various tribes. The forested lands of the Indian reservations have been under conservative administration by foresters for approximately twenty-five years but throughout that period the funds available from federal gratuity appropriations both for protection and administration, aside from those expended for fire suppression, have never exceeded $225,000 in any one year and have averaged less than $100,000 annually from the fiscal year 1910, to the fiscal year 1933. From 1910 to 1933 the average amount available annually from such appropriations for physical improvements within the forested areas on Indian lands was less than $30,000, or less than one half of one cent for each acre of commercial forest land within Indian reservations. Obviously only by the strictest economy and most diligent efforts on the part of the local officials in charge of the Indian forest lands could any improvement in the means of administering and protecting the said forests be effected.

The enactment of the Emergency Conservation Act opened new vistas to those in charge of the Indian forests and inspired them with new hope for an early realization of long-cherished ideals. As soon as the Act was approved by President Roosevelt, the needs of the Indian forest lands were vigorously presented and persistently urged. Since April 15, 1930 the Forestry Branch of the Indian Service has been charged with the duty, under the general direction of the Commissioner of Indian Affairs; of administering the non-forested grazing lands on Indian reservations amounting to approximately 35,000,000 acres. Two of the greatest needs of these range lands had long been recognized as a lack of sufficient and well distributed watering-places for stock and the prevention of farther erosion and the rehabilitation of lands already greatly injured by erosion.

The plans formulated in April, 1933 for the expenditure of funds that it was hoped would be made available under the Act of March 31, 1933 gave exceptional prominence to erosion control and water development. In fact these phases of the conservation work on Indian lands appeared to demand the assignment of a very large part of any funds that might be received by the Indian Service to projects that were undoubtedly considered of a rather incidental importance when the Conservation Act was being formulated and under discussion in the Congress. This situation was due to two facts; first, the great preponderance of grazing lands within Indian reservations, second, the relatively greater need for relief in the form of employment for the Indians who occupied the open plains areas in the Dakotas, Montana, Wyoming and Oklahoma and the vast semi-arid regions in Utah, Nevada, Southern Colorado, Arizona and New Mexico.

The allotment of natural timber lands in Michigan, Minnesota and Wisconsin and the subsequent transfer of title to a large part of these lands to whites and a similar process in Oklahoma made it difficult to find projects in those states that would come within the forest improvement purposes of the Act, i. e., the

development of forest lands in such manner as to redound to the benefit of the public or a substantial group or community. From the first the position was taken that the employment on Indian reservation work should be confined as much as possible to Indians. This requirement tended to restrict the number of men that could be assigned to forested reservations in western states, for these reservations have a relatively small population as compared to the reservations in the Great Plains and in the southwestern district. Thus it happened that over two-thirds of all the work to be done on Indian lands under the Emergency Conservation Act was allocated to Arizona, New Mexico, Montana and South Dakota where range improvement rather than forest development constituted the principal work to be done.

As the work progressed the advisability of this allocation was clearly established. The Indians of the Plains and the Southwest eagerly embraced the opportunity for employment and at nearly every reservation they filled or exceeded the quotas originally assigned. Adverse economic conditions in general and the special distress of the grazing industry, coincident with several years of drought had reduced many Indian families to a condition of destitution. Crop failures in Montana and the Dakotas in 1933, accentuated the conditions that existed when the conservation work was planned in the spring of 1933.

Prior to May 1 the Indian Service had been assured informally that $5,875,200 would be assigned to the Indian Service for expenditure on Indian reservations but not until June 20 were these funds finally definitely made available for expenditure. While active preparations for the undertaking of the great task were being made through May and June, orders for supplies could not be placed nor definite commitments as to personnel made until the funds were actually avai able. At a few reservations work wa begun early in July but supplies an equipment were not received nor a wor ing organization effected on many reserv tions until late July or early Augus The field forces of the Service threw the whole energy into the work and thoug there were many reasons for annoyanc and discouragement, the morale of th men was generally maintained at a hig level and enthusiasm overcame the nu merous and perplexing difficulties.

At the end of July only 4,500 enrolle men were reported at work in eightee states. At the end of August the numbe of enrolled men had risen to 10,372 an at the close of September the numbe reported was 11,943. This number wa substantially below the 14,400 originall authorized but it must be noted that very large number of teams and pac horses owned by Indians were being hire on the work and the income derived fro the use of these animals afforded a direc means of relief to families that had pre viously been able to find no profitabl work for their horses, mules or burros Reports at the end of September showe nearly 700 miles of truck and horse trail over 500 miles of telephone line, 200 miles of roadside clearing, 100 miles o boundary survey and marking and 400 miles of range fence completed. By Sep tember 30 more than 100 springs an wells had been developed, and over 150 stock-watering reservoirs constructed many with a water surface of severa acres; poisonous or noxious plants ha been eradicated from more than 6,000 acres; erosion control has been effecte on nearly 30,000 acres; and rodent con trol work had been done on more than 1,000,000 acres. In addition to these pri mary accomplishments nearly 100 bridges had been built, 100 barns, sheds and othe buildings constructed, miles of livestock driveway cleared, and posted and fir hazard reduced on a substantial acreage

More than 7,000 man-days had been devoted to fire suppression.

Large forest areas heretofore inaccessible have been opened-up by trails, so that the time required to reach forest fires for suppression purposes will be greatly reduced. Communication by telephone has been vastly improved on a score of reservations. Hundreds of thousands of acres of range land heretofore largely useless because of lack of water are now available and in Montana and the Dakotas, ranges that have not heretofore been covered by stock permits, have already been sought by stockmen and are now affording a revenue to the Indian owners. On large areas the destructive influence of erosion has been checked and the loss of hundreds, perhaps thousands, of animals saved annually through the eradication of poisonous plants.

Early in November the Indian Service received a further allocation of $4,000,000 for the continuation of the Emergency Conservation Work until April 30, 1934. While work in the higher elevations of the western reservations must cease during two to five months of winter, projects have been selected at lower elevations that may be continued through the winter months and in the Lake States and on most of the reservations in the Southwest work will be carried on, with a somewhat reduced force, throughout the winter.

Arrangements have been made for the operation of four or five training camps during January, February and March at which selected Indians will be trained in the elements of forestry practice, erosion control and other range activities with a view to fitting them to assume a higher degree of leadership in such work among their own people.

From the standpoint of conservation of health, self-respect and other social values the Emergency Conservation Work on Indian reservations may be fully justified; but the benefits are by no means fully measured by social values. The physical improvements on Indian lands have added very substantially economic values to the wealth of the nation.

POLITICAL ACTIVITIES IN THE CIVILIAN CONSERVATION CORPS

COMMITTEE REPORT TO NEW ENGLAND SECTION, SOCIETY OF AMERICAN FORESTERS

At the summer meeting of the New England Section of the Society of American Foresters held at Lost River, New Hampshire, on September 7, 1933, a committee was appointed consisting of H. H. Chapman, Philip W. Ayres, and Harris A. Reynolds, with Chairman A. C. Cline, *ex officio,* to investigate reports of political interference with the work of the Civilian Conservation Corps in various states. Orders had recently been issued from the office of the Secretary of Agriculture which required that future appointments of nontechnical men to positions of supervision in the Corps must thereafter be made only from lists submitted from Washington. These lists were to receive the approval of the member of Congress from the district in which the camps were located, and that of the special assistant, Mr. J. Friant, assigned to the Department for the purpose of ascertaining the political affiliation and record of appointees.

While the technical men, or foresters, were in no way affected directly by this order, it appeared from several reports that such appointments as did not require or could not be made from technical ranks threatened to become a demoralizing influence to the serious detriment of the work.

Mr. Robert Fechner, present at the contemporary meeting of the American Forestry Association, made the open statement in conversation that the necessity for issuing this order arose from the discovery that in the State of Montana the C.C.C. appointments had been one hundred per cent Republican, and that similar trouble had also arisen in California and other states; that the administration could not permit the control of this work to pass into hands hostile to the President's policies. The cases which had com to the attention of the Section, on th other hand, seemed to indicate that tro ble had arisen after the order had bee issued, and consisted in appointing ineff cient foremen for political reasons, an in resisting the removal of these men fo the same reasons.

In response to a general request fo information, which is most cases had t be treated as confidential, the Committe is prepared to report its findings. Th evidence gathered is fragmentary an decidedly lacking in completeness but authentic as far as it goes, and no hea say evidence has been considered.

The appointments of technical foreste in the C.C.C. have never been interfere with politically nor is there any tendenc in that direction at date of writing. Th supply of foresters and technicians wa however, inadequate. It was necessary an even advisable to seek trained engineer for the positions of camp superintendent while for foremen's jobs, considerabl more than half were filled from outsid the profession of forestry.

The appointments to these position lay first with the U. S. Forest Servic for camps on national forests, and wit the Department of the Interior on nationa parks and Indian reservations; secon with state foresters on state forest land or in private lands within state jurisdi tion. The Committee has abundant ci cumstantial proof that serious politica trouble arose over these appointment but has not been able to unearth an direct evidence to justify the contentio that the appointments originally made b foresters in national or state employ wer on a political basis.

What the investigation did emphasiz was the apparent absolute inability of

certain class of politicians to realize the possibility or even the existence of a spirit of public service based on professional standards, which puts efficiency above party alliances and ignores or remains purposely ignorant of the political affiliations of men selected for public appointments.

In the U. S. Forest Service, from the time of its origin until the advent of the C.C.C. the only basis for appointments had been ability to perform creditably the duties of the office. When the huge task of organizing these camps was unloaded on the Forest Service, already strained to the breaking point by the continuous zealous efforts of its own supervisory force to increase efficiency, cut down personnel and save money, these U. S. foresters reached for the best men to be had, regardless as usual of their political faith.

Such attitude was incomprehensible to local politicians, especially in those states where a Roosevelt democratic victory by aid of republican votes had put in office a horde of hungry "horseflies," to paraphrase Aesop's fable, who had not had their turn at the fox. In their eyes, the admission of even one "Republican" to the fold offset the ninety and nine good democrats who might be included. This was not the attitude of Mr. Fechner, who was willing to admit that a reasonable percentage of appointees could be republicans, but "not 100 per cent!" That would show evidence of deliberate political organization hostile to the administration.

The worst possibilities of this clash of standards were realized in southern Idaho. Out of deference to the Governor, a democrat, the regional forester accorded him the privilege of submitting a list of candidates, at the same time stating that all appointments would be strictly on merit. The regional forester's appointments happened to include one or two rather prominent engineers who had been employed by the state under the former republican administration and had lost these jobs when the democrats gained power. The wolf pack had struck a hot scent and the clamor flooded the dome of the Capitol at Washington. An Idaho Congressman promptly accused the Governor of party treachery, holding him responsible for these appointments through the incident of the list. County political committees took up the cry. Extreme pressure was brought to bear on the Forest Service including threats of dismissal launched against the regional forester and supervisors. The Forest Service bent before the storm. Certain of the appointees were discharged at the request of the Governor, their positions being filled by men of his choosing. Several of these men then proved to be so incompetent that it was impossible to retain them in the organization despite their political backing. The number of camp superintendents and foremen, otherwise competent, who were forced out by political pressure, was surprisingly small considering the amount of noise made, but was amply sufficient to show up the possibilities of this method of transacting government business. In every such case, a distinct loss of camp morale occurred both in the supervisory force and among the boys. It was brought out in stark frankness by local political committees that they were not interested in the efficiency of the overhead, but only in securing jobs as rewards for political services to the party. These local politicians in some cases even tried to create dissension in camp by stirring up trouble between the army and civilian overhead. All this trouble occurred in Idaho in the spring and before the issuance of the orders from Washington which Mr. Fechner and Postmaster General Farley sponsored in the belief that where there was so much smoke there must be some fire and that the President's program must be protected by securing from then on none but Democrats approved by the Congressman from the district.

This attitude in which the possibility of professional efficiency in public service regardless of politics was ignored as if nonexistent, encountered stiff resistance in the office of the Secretary of Agriculture, under whom the Forest Service operates and who is therfore directly responsible for results in the C.C.C. camps. The policy of placing government work on the plane of nonpartisan efficiency is not peculiar to the Forest Service but is the basic plan of the scientific branches of the Agricultural Department. The Secretary, while unable to resist the demands for supervision of the politics of the nontechnical appointees, to be exercised by Mr. Friant, did secure a ruling that this political selection should apply only to new appointments, and that no previous appointee should be discharged because of his political beliefs. It was also made possible to fill vacant positions by promotion.

Due to this vigorous support and to the fact that the supervisory force in these camps had for the most part been selected purely on the basis of merit, before local and state politicians became aware of the possibilities of plunder, the investigating committee finds that for the most part there has been almost no political trouble with national forest camps except in the extreme case which developed in Idaho. In one sporadic instance in the South, determined efforts were made by prominent Congressmen to secure the dismissal of a forest supervisor, who incidentally was a Democrat, for daring to appoint, on merit, a man who proved to be a Republican. Disgruntled politicians and special agents sent out to "investigate" apparently are still flooding Director Fechner's office with reports of continued political hostility to the President, but the real situation may be judged by comparing the following two letters:

Emergency Conservation Work
Office of the Director
Washington, D. C.
October 23, 1933.

Mr. H. H. Chapman,
Professor of Forest Management,
Yale University,
New Haven, Connecticut.

Dear Mr. Chapman:

In reference to the conversation we ha while on an inspection trip in the vicinit of Franconia I wish to say that I wa basing my statement on written and ora statements that had been made to me b responsible people from Montana, Wash ington, Idaho, Utah, California and othe states. I have since had this statemer checked up by a personal investigato whose reports indicate that basically th charges that only Republicans were bein appointed to supervisory positions in ou Emergency Conservation Work camps wa true. Within the last few weeks the sam statement has come to me from othe states, some of them in the eastern sectio of the country.

I have no doubt that the check made b anyone interested in the matter would show definitely that political activity an affiliation has been a determining facto in appointments to supervisory position in Emergency Conservation Work proj ects from superintendent down to th lowest grade.

Sincerely yours,
(Signed) ROBERT FECHNER,
Directo

Department of Agriculture
Washington, D. C.
November 1, 1933.

Prof. H. H. Chapman,
Yale School of Forestry,
New Haven, Connecticut.

Dear Professor Chapman:

I appreciate the spirit in which you an your associates on the special committee of the New England Section of the Society of American Foresters have written you

letter of October 11. I hardly need to say that my viewpoint on these matters is like your own. I think it is a sufficient answer to say that there was quite a vigorous and extensive criticism of the Forest Service on the grounds that its set-up in connection with the C.C.C. work was dictated by, or effected in conjunction with Republican Party organizations. We conducted enough of an investigation to satisfy ourselves that this was not true. So far as we have been able to find out, the Forest Service has made its appointments on the basis of the work to be done, as freely as it has in the past, and without any improper political bias. There has been so far as I know, no charge that the Forest Service was unduly political in favoring Democratic applicants and I have satisfied myself that there was no undue preference the other way.

Sincerely,
(Signed) H. A. WALLACE,
Secretary.

As an example of the truth of Secretary Wallace's statements, can be cited the results of the investigation into the Idaho flare-up. The political affiliations of nearly 500 appointees, unknown at the time of appointment, were investigated by the Forest Service and ascertained as far as possible. Only two-thirds of these appointees could be found to have any definite party affiliations. Of those who had, it was discovered that 67 per cent, or two out of three, were Democrats.

Mr. Fechner's challenge, that a check made by anyone interested in the matter would show definitely that political activity and affiliation has been a determining factor in appointments to supervisory positions in Emergency Conservation Work from superintendent down to the lowest grade, has been definitely met and answered, with respect to national forest camps, first by the Secretary of Agriculture, and second, by the information obtained by this committee, comprising hundreds of letters from all parts of the United States.

The committee can give no information regarding camps on national parks and Indian reservations, not having had access to sufficient sources to render any opinion.

There remains the question of camps on state and private lands. Here the appointments were made by the state forester or corresponding official. It was not possible to obtain exact information from all of the different states involved. The situation is affected by two factors: First, in a certain number of states, the state forestry organization which should have had the appointive power, was dominated by politics and could not stand on its own feet. Second, this political control of what ought to be a nonpolitical department of conservation was not in every state a democratic control but might be republican or farmer-labor.

As Secretary Wallace states, "There has been, as far as I know, no charge that the Forest Service was unduly favoring Democratic applicants", and the committee has heard no complaint from the Director of the C.C.C. that democratic state officials have been using the C.C.C. appointments as political rewards. Yet the most glaring case of political interference and incompetency in this work was found by the committee to be in the State of Louisiana where all appointments to state camps were dictated from the Governor's office with the tacit consent of the state forester, and where political rather than professional efficiency was demanded. In Minnesota the administration, on a farmer-labor basis, interfered with state appointments, and the local farmer-labor political county committees became as perniciously active as those of the Democrats in Idaho. In this case, the regulations from Washington were actually beneficial in checking this local disrupting influence but not till after great harm had been done. In California the state officials, who were given complete control of the appointments to state camps, came under the suspicion of

Washington because the administration was republican and that fact was said to have influenced the choice of appointees. To the best of the committee's knowledge, the appointments in this state have, however, been made on the basis of efficiency.

In the New England States a few sporadic cases cropped up in Massachusetts and New Hampshire of appointees recommended by Congressmen proving inefficient, but the organization has been successful in separating these men from the service. In none of these states has politics seriously interfered with state camps.

The State of Washington presents a good example of the effect of the "precautions" taken by the Washington office to protect the work against adverse political organization. The great majority of the fire wardens in this state are not politicians, and the same is true of other states maintaining an efficient, stable and permanent fire-fighting force. Even in the most political city governments the fire department is kept out of politics regardless of party, and it is not held that fire-fighting must be organized on democratic or republican lines. But when these experienced wardens were appointed as camp superintendents the Washington office refused to confirm the appointments as they did not appear on the recommended lists of the Department. The efficiency of the camps was threatened by the necessity of finding Democrats first, and able woodsmen second.

Throughout this investigation it has been apparent everywhere, first, that wherever the appointive power was free from direct political pressure, the appointments were made solely on merit, with the result that the President's program was launched successfully and many real obstacles overcome; second, that in practically no instances previous to the inauguration of centralized control over the political complexion of the appointees, had the power thus exercised been purposely used to strengthen political organizations hostile to the administration; third, that everywhere the promulgation of the rules requiring the future appointments to be from political lists was regarded with extreme apprehension as threatening the future efficiency of the work; and finally that the only reason why these apprehensions have not been justified is because of the compromise insisted upon by the Secretary of Agriculture, insuring the retention of existing appointees. The entire force of testimony from the field emphasizes: first, that the C.C.C. camps have on the whole been conducted with highest efficiency and success; and second, that this result has been due not to the insistence on Democratic support of the President, but on the infinitely better basis of nonpolitical appointments based solely on merit, which up to date has dominated and controlled the operation of the camps almost as universally with regard to civilian appointees as in the army itself.

The charges of the Director of the C.C.C. camps with regard to hostile political influences as generally and increasingly applicable to this organization considered by your committee as disproved by the widespread evidence submitted to the contrary. The principle advocated, of insistence on political sponsorship for future appointments has in the opinion of your committee been demonstrated as vicious, tending to undermine and disrupt the work, and especially detrimental when it gets out of hand and appointments become the spoils of county political organizations. There has been no disposition on the part of the Director's office to criticise conditions in states where this political domination happens to be Democratic. Your committee emphasizes the fact that in this crisis, professional foresters have almost without exception endeavored to place public service and efficient performance above party loyalty, whether the party be democratic republican or farmer-labor. We find that

in at least two cases the official positions of state foresters were seriously imperilled by this attitude and we reiterate the importance of insuring active, even militant, support by the Society of public officials who resist political pressure in the interests of honest public service, and urge continuous efforts to bring home to the public the distinction between a specious partisan loyalty on the one hand, and an uncompromising devotion to public welfare regardless of party on the other. Politics being what they are, a final comment is in order. It is indubitably true that the installation of the system whereby only democrats approved by Mr. Friant can secure future appointments in nontechnical positions on the C.C.C. force has operated to allay a growing hostility on the part of Democratic Congressmen and politicians to the work of the C.C.C. camps, and that this control is less harmful when exercised from Washington than when placed in the hands of county politicians.

A. C. Cline, *Chairman*
P. W. Ayres
H. H. Chapman
H. A. Reynolds

Old Boiler Plant Made into Forest Utilization Laboratory

Among the numerous changes as part of the rejuvenation program of the New York State College of Forestry is the transformation of the old boiler house into the forest utilization laboratory. After the addition of a few windows, a new floor, new heating system and a fresh coat of paint, both inside and out, the building offers excellent laboratory facilities.

The rear section of the building houses the timber preservation equipment. Two complete pressure impregnation cylinders with the necessary storage tanks and pumps make up this equipment. The larger cylinder has been increased from six to nine feet in length for the purpose of accommodating cross ties, fence posts and larger timbers. Classes in timber preservation will now have the opportunity to work without the congestion experienced in the old laboratory.

The front of the building will hold the wood-working machines. These machines are being repaired and made ready for the new course in wood-working machinery which has been recently added to the curriculum.—Ray F Bowers, *New York State College of Forestry.*

LOCAL GOVERNMENTAL CONTROL IN LAND UTILIZATION AND FORESTRY[1]

Part II: The Forestry Ordinance

By F. G. WILSON[2] and F. B. TRENK[3]

This subsequent article shows how a county can establish and provide for the management of county forests, utilizing land acquired by tax deeds.

ANY plan for land zoning which restricts agriculture to lands suitable for farming and located near existing roads and schools is inconceivable without alternate uses for the remaining land. In cut-over areas the first alternate use which comes to mind is forestry. This is especially true for those areas where much of the land has reverted to public ownership through nonpayment of taxes. In fact, it was not possible to arouse public interest in zoning until county forests had been established and the arrival of new settlers in such areas brought popular resentment. Now that these tracts are definitely dedicated to forestry, the need for aggressive local governmental control is evident. It calls for a type of control that is fundamentally administrative and the legal instrument for that administration in Wisconsin is the forestry ordinance.

Enabling legislation for the establishment of county forests in Wisconsin is found in the statutes, and indicates a recognition by the state legislature of the necessity for counties to develop a use for lands acquired through tax delinquency. To supplement town and school finances, the counties have been permitted to enter county owned lands within definitely established county forests, under the provisions of the Wisconsin Forest Crop Law, the county's share of annual payments, as owner, under this law having been waived.

The Wisconsin Forest Crop Law requires the active practice of forestry on lands entered as forest crop lands. It was perfectly obvious that counties would not be in a position to meet this requirement of the law while the administrators of the law—the Conservation Commissioners—could not waive the requirement. To prevent an impasse in this situation and at the same time, insuring the stability of the county forest program in the state, legislation was enacted directing payment to the counties, from Conservation Department funds, of the sum of ten cents per acre per year on all county owned forest crop lands within legally established county forests. This money is to be expended by counties under state supervision, in developing forestry on the county forests; the state in return, receiving 75 per cent of the stumpage value of all products cut on such lands. As of March 1st, 1933, over 800,000 acres of county forest land were in operating county forests, subject to this state forestry aid.

Progress in local forest development to this point represents a long, forward step in providing a basis for organized land use, where large areas of unproductive land, with "disinterested" ownership had created acute problems in local governmental finances. It opened an entirely

[1] Local Governmental Control in Land Utilization and Forestry. Part I. Jour. For. November, 1933. Pp. 796-806.

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new field in local governmental activity—forestry control and administration.

To the potential complaint that this situation merely adds another type of public forest administration, with its consequent multiplicity of rules, regulations and overhead expenses, we find an adequate answer in the organic basis for county existence. After all, the county is but an arm of the state, deriving all of its power from state law. Its forests, therefore, should be considered an adjunct to the state forests, with several definite aspects of state control. The state, on the other hand, has avoided the necessity of large cash advances to purchase these lands as state forests.

Administration of county forests immediately following their establishment has been on the basis of various "resolutions" passed by the several county boards of supervisors. The counties themselves are recognizing, however, that permanent administrative policies, and a stable organization, must be set up, to successfully conduct the work which is consequent upon the annual state forestry aids. Marinette county was the first in Wisconsin to set up, by ordinance, a definite administrative agency, and determine upon county forest policy. The ordinance is, in effect, a codification of state law bearing on county forests, and a direct move on the part of the county to put into operation the powers granted it by the state. For Marinette county, this means that over 100,000 acres of county forest land will be subject to administrative control and development.

Other county boards, in counties where county forests are in existence, have similar ordinances under consideration, and it is anticipated that within a short time all counties will be operating their forests under a comprehensive forestry ordinance. Six features in the Marinette county forestry ordinance suggest the broad powers granted to the county, and the extent to which a county may go in defining complete administrative functions for its forests. It provides for fixing administrative responsibility upon a definite committee which body is, in turn, authorized to employ a competent administrative agent. For the immediate future this agent is likely to be someone already employed by the county, in a few cases it will be the county agricultural agent. Because the operating funds for the county forests come from the Conservation Department, this department is to maintain technical supervision over the actual work done on the forests.

The ordinance standardizes procedure in defining or changing forest boundaries, and in the application to enter or withdraw forest crop lands. Definite boundaries to county forests are required where counties are receiving county forestry aid money. Special regulations during periods of extreme fire hazard are likely to be prescribed, under county authority, within these forests; hence, these boundaries must be a matter of record, and should be of common knowledge. Procedure for entering additional county owned land under the forest crop law from time to time, or withdrawing descriptions from entry, as the need may arise, is made sufficiently clear, thereby facilitating the keeping of state records with reference to authority for application, completeness of description, and other clerical matters.

Certain restrictions on the conditions under which land may be sold within a county forest, and the land withdrawn from forest crop law status are designed to prevent hasty and ill-advised action by county officials. This provision in the ordinance contemplates the establishment of a definite policy restricting land sales within county forests. The formulation of such a policy is hastened and simplified where counties will have adopted a zoning ordinance.

County forests are recognized as subject to special land uses, not in conflict

with forest production. Provision is made for the orderly use of these public lands for recreation through a permit system for hunting and fishing cabins. Not infrequently, county forests may be called upon to serve in part, the function of county parks. The proper regulation and control of such use is assured.

Practically all counties having county forests will, in the not distant future, have some forest products to offer for sale. State law provides certain restrictions on the sale of such material cut from lands receiving county forestry aid money. The ordinance goes farther than the law applying to state approval and equity, and lays down certain principles calculated to be of best advantage to the county.

Procedure for dealing with the annoying and all-too-common practice of trespass is outlined to the various county officials involved, as provided by various sections of the statutes. Admittedly, the county cannot go farther than state law in penalties, but through the ordinance the activities of various agencies of the county are focussed on this evil. Confiscation of materials cut in trespass authorized by law and specifically charged as a responsibility of the administrative agency in the ordinance, has already had a wholesome effect.

An analysis of the foregoing features of the forestry ordinance indicates that a well balanced legal instrument has been established, covering all of the vital phases of administration of county forest lands. The successful application of the forestry ordinance is the most tangible evidence that local public forests have passed from that classification flippantly termed "paper forests." Actively operating county forests have come to stay.

EUROPEAN FACTS FOR AMERICAN SKEPTICS

By WARD SHEPARD and FRANZ HESKE

This article was prepared in Petersburg, Czechoslovakia, in April, 1933, three months before N. R. A. became the law of the land, and long before Article X of the Code of Fair Competition for the Lumber and Timber Products Industry was even conceived. It is, therefore, of peculiarly timely interest to those foresters and timberland owners who took part in the three days' conference on Article X, October 24 to 26, and who are now engaged in the perfection of the plans for making its provisions operative. Of the two authors: Ward Shepard has had many years' experience in national forest administration in this country and in many matters having to do with the development of forest policy. He was an active and influential member of the committee which formulated the Forest Policy for the United States as adopted by the Society of American Foresters in 1931. During the spring and early summer of this year he played a most constructive part in building up public and private support of the principles embodied in Article X of the Lumber Code, and in the October Conference. During the past year he made an intensive study of forest policy in the German speaking countries of Europe under the auspices of the Carl Schurz Memorial Foundation of Philadelphia. Dr. Franz Heske is a well known forester of Europe. He has had wide experience in organizing large private forest estates in India and in Central Europe to meet the exacting economic conditions of the post-war period, and is an authority on private forestry in Europe. As Professor of Forest Regulation in the Forest School at Tharandt, Saxony, it is interesting to note that he now occupies the same academic chair which was occupied 75 years ago by Pressler, the famous author of many of the forest finance formulae criticized by this article. Professor Heske is also Director of the Institute of Colonial and Foreign Forestry at Tharandt. The responsibility of the authors is as follows: Shepard vouches for all statements concerning America; Heske, for the accuracy of the facts and the soundness of the conclusions concerning European forestry.

IT has been frequently said of late that there is no such thing as profitable private forestry in Europe, that there can be no such thing in America, and that the only solution of the American forest problem is the nationalization of the forests. These ideas have been especially emphasized in an article by Mr. Edward C. M. Richards, entitled "Old World Forestry for New" in the March 1932 number of *American Forests,* the main arguments of which were repeated in an article entitled "American Forest Policy" in the JOURNAL OF FORESTRY for March, 1933. As these articles are based on extensive recent travels by their author in Europe and as they seek to interpret European experience in order to clarify some of the basic conceptions of American forest policy, the authors of this article deem it important to take issue with many of the chief conclusions presented by Mr. Richards.

Stripped of secondary points, Mr. Richards' arguments are as follows:

There is no "free" private forestry in Europe, defining free as freedom from public legislative restrictions or from social pressure.

The un-free forestry of Europe (e. g. forestry practiced with various legal restrictions to prevent deforestation) can not be applied to America.

The only alternative in America is for the public to buy up the forest lands and carry out its own forestry program, without any private initiative.

If this chain of ideas is right, it does indeed give a depressing picture of the future of forestry in America, for no one in his senses will believe that the public (i. e. the federal and state governments) can or will buy up all or even a major fraction of the total forest lands of the United States, even in the course of generations. Even with the largest conceivable program of public forest purchase in America, there would still remain vast forest areas subject to devastation. Mr. Richards' implication is that

nothing can be done to prevent this devastation. We believe the experience of Europe contains a very different lesson from that presented in the conclusions summarized above. We believe that highly organized and highly profitable private forestry similar to that of Central Europe can and will be worked out, with modifications and with substantial government aid, in the private forests of America. We believe that public forests are highly important both for America and for Europe, but that private forestry must also play an indispensable part in forest conservation. We believe that the tendency of many foresters to be pessimistic over the possibilities of private forestry comes, first, from a lack of acquaintance with the facts, and, second, from the uncritical repetition of threadbare and discredited dogmas handed down from early generations of European foresters.

For these reasons, we are examining in some detail Mr. Richards' conclusions, which for the sake of simplicity we have paraphrased and here print in italics.

1. There is no "free" private forestry in Europe, according to Mr. Richards.

The broadening of the term "free" to include freedom not only from legal restrictions against forest devastation but from the pressure of public opinion brings confusion into the discussion. Social pressure to prevent devastation is highly variable even in Europe, and in spite of it there is and has been devastation. There is a very strong public sentiment against forest devastation in America, but it has never been adequately focussed and utilized because many of the persons best acquainted with the facts have felt it their duty to protect forest devastators against public opinion rather than to protect the public against devastation. Others have assumed that legal restrictions against devastation were inapplicable because of some peculiarity of the American temperament, in spite of the wide incursion of public regulation in many other economic fields where apparently the same type of "rugged individualism" accepted the inevitable.

The only rational discussion of "free" forestry can be had by confining the word "free" to freedom from *legal* interference with forest devastation. In this sense there is a vast amount of free forestry in Europe.

In Germany, up to the end of the World War, only thirty per cent of private forests were protected by law against clearing or devastation. In the remaining seventy per cent there was no direct state control over forestry practice, except that in the entailed estates the present owner could make no inroads into the *substance* of the estate but must hand it on to his successor unimpaired. This provision, coupled with numerous other factors (including family pride), led to a fine management of the entailed forests. Nevertheless, it is true also that even in the non-entailed estates[1] and in the larger forests in states having no restrictive forest legislation, there is as a rule good forest management, though not always the best. The principal exception to good management of forests is to be found in the small peasant holdings, where restrictive laws are difficult to enforce even where they exist, because of the small size of the holdings and the complexity of administration.

Now, we must note a peculiarity about "free" forestry in Germany. Such laws as Germany boasts for protecting private forests (with one or two exceptions) are largely confined to two requirements: the forbidding of devastation (or stated posi-

[1]Thus Prince Schwarzenberg owns in Bohemia, Austria, and Germany about 340,000 acres of forest, of which only a small part is entailed. Yet both kinds of ownership have been treated with the same intensive forestry methods through the conscious choice of several generations of the Princes.

tively, the requirement of reforestation), and the forbidding of forest clearing for agriculture without permit. These, it will be observed, are mere *minimum* requirements. All the rest is left to the owners. And what do these harassed landowners, engaging in this "unprofitable" business of forestry under state compulsion, proceed to do? Well, most of them are managing their forests by the principle of continuous sustained yield (not required by law); they have elaborate working plans (not required by law); they carry out a highly intensive silviculture (not required by law); they employ highly trained foresters; they are exceedingly proud of their beautiful forests; and they strenuously resist all efforts to nationalize their forests, by purchase or otherwise.

Let us now look at another phase of free forestry. Mr. Richards cites Czechoslovakia and the many oppressive and detailed restrictions imposed by this law on the private owners. But this law is *only ten years old,* whereas the estates it seeks to regulate have been under intensive management for many years, often several generations. Thus the estate of Prince Schwarzenberg, which contained before the recent expropriations almost 350,000 acres, was brought under sustained yield management in 1790;[2] that of Prince Liechtenstein at the end of the 18th century; that of Prince Hohenlohe about 1790. These are only a few examples of a very large number of estates brought under sustained management between 100 and 150 years ago in Austria.

Before Czechoslovakia's separation from the former Austrian Empire, her private forests were governed by the Austrian forest law. This law dates back only to 1852 and was consequently long subsequent to the main organization of private forestry in Austria. Moreover the management of these estates is in general up to or above the requirements of the most stringent laws.

The best proof of the long time management of these forests—better even than the historical record of working plans—is written in the forest itself. For these old forests all have an approximately normal distribution of age-classes of trees—that is, an equal area of each age from the youngest to the oldest, say from one to one hundred years. To work out such a distribution requires cutting by sustained yield for at least one rotation—i. e. approximately one hundred years.

What conclusions are we to draw from these facts for America? *Intensive* forest management in Central Europe is largely free. Compulsory legislation prevents the unwilling owner or the mere speculator or the abuser of the property right from devastating his forest and thus victimizing the public. A restrictive law against forest devastation in America would no doubt face difficulties; but it would probably, from the start, be loyally obeyed by the majority of owners, as the Idaho slash disposal law was obeyed in spite of a feeble public administration; and this majority would form precisely the needed additional pressure to bring unwilling owners into line.

A minimum, basic law *forbidding forest devastation*—a law that most nations of Europe take for granted— is an essential preliminary to the rapid adoption of private forestry in America. It would put all forest owners on an equal basis. Every owner would recoup the costs of reforestation from the higher prices of lumber that would automatically come. Without such a law, every owner who wishes to practice forestry must compete against cheap lumber produced from destructive logging. The forbidding of devas-

[2]Since 1850 the estates of Prince Schwarzenberg have boasted a special working-plans institute, which every 10 years revises the working plans for all the forests.

tation is an indispensable protection both *to the landowner and to the public.*

It is not the function of foresters to oppose public interference with the destructive use of private property. It is their duty to point out the facts and to evolve *the minimum plan that will prevent such destruction.* If this plan involves a curtailment of private property rights, it is up to the higher administrative and legislative agencies of the government to decide if and when such curtailment should be applied, as they have decided in numerous other instances of such curtailment,— for example, in the control of railroad rates, regulation of public utilities, building restrictions, etc.

It is now the duty of foresters, and they are faced with an unusually propitious opportunity, to present a minimum, universal plan to prevent forest devastation. Let the law-makers take the responsibility of deciding for or against that plan. It is not the function of foresters to interpret the Constitution, to determine the exact limits of property rights, or to die gallantly defending the quaint maxims of that poor old Scotchman, Adam Smith.

Ten years ago, the Forest Service, after an exhaustive study, prepared a set of minimum silvicultural requirements to prevent forest devastation in the various forest regions of the United States. That effort was side-tracked for a weak program of "coöperation" which Mr. Richards rightly criticises. This side-tracking came because the forestry experts usurped the political, legislative function in recommending against a system of regulating private forests. This usurpation of function led to the presentation of a program that represented the lowest possible denominator of political agreement. It is now time to repair that error by rejecting the assumption of political authority and standing firmly on the sound technical foundation of the silvicultural practices required to end forest devastation, coupled with a plan of administration that will put those requirements into effect. The general principles of such a plan of administration have been worked out by the Society of American Foresters in its National Policy of Forestry and approved by the President of the United States.

2. *Large estates are on the wane everywhere because of their unpopularity according to Mr. Richards. In many countries they are being expropriated. Estate forestry is likely to be equally unpopular in America. Besides, the European nobility often got their estates ready-made as gifts from the king; whereas no such forest estates exist in America and would have to be created "from scratch."*

It is true that considerable inroads have been made into the large estates of Central Europe through expropriation and otherwise. In Germany, the law of entail (by which the estate could not be divided, but must be handed down intact to the eldest male heir) has been repealed. Yet it would be an exaggeration to say that large estates are likely to entirely disappear from Central Europe. Even in Czechoslovakia, where expropriation has been very drastic, the owners have lost only from thirty to fifty per cent of their possessions and primarily, though not exclusively, agricultural rather than forest land.

In all this postwar land reform, by far the most significant thing from the forestry standpoint is what happened in Prussia. By the Constitution of Weimar, adopted after the war, it was provided that the law of entail must be abolished. In practice, this will mean the break-up of these great estates by division among all the heirs instead of inheritance by the eldest. But even the social-democratic revolutionaries who were responsible for this freeing of the entailed estates, also recognized that forests, in order to be managed effectively, *must be owned in large units.* Additional legislation was therefore passed which provided that en-

tailed forests were to be protected from dissolution. The owner can voluntarily request that his forest alone, or the forest together with enough agricultural land to make a well-rounded economic unit, be maintained intact. Or if it is in the public interest to maintain a given forest intact, the government may decree that it be so maintained. Under this law many forests have already been classified as forest estates and are thus protected from division. Many other German states have also moved to prevent the dissolution of these forests. Here, then, is the principle of large private forest ownership recognized by a radically socialistic revolution.

Also the Nazi party, which rejects Marxian socialism but one of whose cardinal doctrines is a wider distribution of ownership in land and industry, specifically recognizes that, in reasonable measure, the large estate, whether for agriculture or forestry, is an essential part of the national economy, in that it permits the economies of large-scale production essential to assuring food and raw-materials to the population.

Now these great forest estates, so intensively managed, were decidedly not received ready-made by the nobility from the kings. On the contrary, they were mostly unorganized virgin forests, comparable to those of Western America. Their owners opened them up by means of roads and canals; and while exploiting the timber, they brought the forests gradually under sustained yield management. This conversion was not brought about by compulsion nor by fear of a timber shortage, but in order to build up permanent productive properties. Exactly the opposite process to that pictured by Mr. Richards is underway: through expropriation, some states are receiving "ready-made" forests painfully built up by their owners through several generations.

It is difficult to follow the argument that large forest estates do not exist in America and would have to be built up from scratch. The one most significant thing about forest ownership in America is precisely in its extraordinary concentration in large holdings. Call them timber-holdings or what you will, the fact remains that they are estates and that approximately two thirds of the private forests of America are held in large (some of them in immense) units; in other words, under precisely the conditions of ownership required for economic, efficient timber-growing. The great problem in America therefore is not to *create* forest estates, but to bring under management the magnificent ones that already exist before they are dissipated by destructive logging and abandonment for tax delinquency.

This favorable large-unit set-up for private forestry has long been recognized by the Forest Service and by every student familiar with the American forest problem. So far as we are aware, there never has been and is not now any outcry against these large forest estates as constituting a social injustice. But unfortunately this favorable set-up has hitherto never been capitalized.

3. *If forestry were profitable, according to Mr. Richards, it would long ago have been adopted by American forest owners. What makes "free" forestry impossible or unattractive in Europe or in America is, first, the low interest returns on the investment, and, second, the tying-up of capital in forest growing stock that takes a hundred years to mature into saleable timber.*

It is unfortunate that both in Europe and in America there has been and remains much confusion in the whole field of forest finance. Foresters have created financial formulas and then adopted them as dogmas. Until recent months, no method has been worked out by which the returns of forestry, expressed in per-

centage of income to capital, can be objectively determined. The old formulas can be applied to the great private forestry operations of Central Europe and "prove" that they are unprofitable or conducted at a loss. Until forest finance calculations are overhauled, we must depend on indirect evidences as to the profit or lack of profit of such undertakings. We can say, for example, that many of these great private forests of Central Europe have been operated by the same families for many generations as the chief source of their income; that these families live in large and luxurious castles, own fleets of expensive motor-cars, have picture galleries full of paintings and tapestries of fabulous value which American millionaires seek, often in vain, to purchase, and show numerous other signs of failing to recognize the distressing bankruptcy into which the forest-finance formulas have plunged them and their ancestors through so many generations.

Confronted with these evidences of the financial success of private forestry, one might suppose that foresters would begin to suspect their calculations. The truth is that in normal times and over long periods, these estates return year in and year out approximately as high a return as that received from any other form of capital conservatively invested for a similar period. The returns of capital invested in industrial enterprises as compared with those invested in forestry are grossly exaggerated. As an example may be cited an interesting American experiment that covered a hundred years of continuous investment and reinvestment. When Benjamin Franklin died he left a small sum ($5,000, if memory is not in error) to the city of Boston to be invested and accumulated for one hundred years and the proceeds to be used for founding a trade school for mechanics—the present day Franklin Institute. This legacy, throughout its history, was in the hands of a committee of trustees that always included outstanding bankers. They invested the original capital and the yearly proceeds in the best available conservative investments. It may be inferred therefore that this capital received a far more intelligent and careful nursing than most private individuals can ever give to their own investments. At the end of the century, the Franklin fund had returned a net average interest rate of 4½ per cent. The average rate of income of a given privately-managed investment over fifty or a hundred years would be probably little or not at all above three per cent, allowing for financial depressions and failures of industrial enterprises. Doubtless speculative investments can and often do obtain higher returns; but for every speculation that wins, two or three or more are wiped out. In the field of non-speculative investment, which is what most people are interested in, forestry in Central Europe probably pays in the long run about the same return as any other sound investment.

What is the trouble with the forest-finance formulas? They involve a sleight-of-hand trick. This trick is known as determining the "expectation value" of the growing-stock. The assumed value of the young timber when it reaches maturity is discounted to the present at a certain rate of interest. The trick is this: the rate of interest must be *arbitrarily assumed.* But this entirely vitiates the result, since it assumes the very thing we set out to discover, namely, the rate of return! A method to determine the actual return of forestry investments without resorting to this fallacy of logic has recently been worked out in Germany, but has not so far been tested on a large scale.

Time! There are two classes of people who seem to be somewhat confused on the problem of time—namely, the philosophers and the foresters. Philosophers of late have been inclined to take the view that time and space are the same. We do not feel competent to dispute this,

though we find it a little confusing. We do, however, dispute the foresters' confusion over the time problem in forestry. It takes sixty, seventy, or a hundred years, say the foresters, for a seedling tree to reach maturity. Therefore the owner's capital is "frozen" in these young trees that are so leisurely approaching maturity.

In a sustained yield forest (i. e. a forest where a given amount of timber is cut every year just equal to that year's growth in the whole forest, young and old), the growing-stock and the land constitute the capital. The income on this capital is the mature trees cut each year, and these mature trees are the equivalent of the year's growth on *every* tree. Now, the capital represented in growing stock is "frozen" in precisely the same way that the fixed capital in a railroad (tracks, road-beds, rolling-stock, terminals) is frozen, or the fixed capital of a manufacturing plant (building, machines, etc.) The young trees can be cut and sold for what they are worth just as the railroad tracks can be torn up or the machines of a factory dismantled and sold as scrap. But in so doing, you destroy the organic income-producing capacity of your forest or your railroad or your factory.

Forest capital is no more and no less frozen than railroad or factory capital. The individual stock-holder of a railroad can, to be sure, sell his stock and reinvest. It is true also that in Central Europe most forest ownership is individual, and capital must be liquidated by selling part or all of the property. But there is no fundamental reason whatever why the joint-stock company or corporation type of ownership can not be applied to forestry; indeed, it is probable that private forestry in the large forest estates in America will take precisely that form.

This confusion of the time-element in forestry comes from confusing trees as *capital* and *trees* as *income*. In a sustained yield forest all trees are constantly performing both functions. Every capital tree grows income every year, namely, the annual ring. But you can't strip this income off; you must take its equivalent in mature trees. Thus the mature trees suddenly cease to be capital and become income. But this happens every year, so that every year you collect your income from the whole forest.

There is no postponement of income in sustained yield forestry; it is a fiction to say that the capital is frozen and the income endlessly deferred. On the contrary, forestry as worked out in Central Europe is unquestionably one of the most flexible and at the same time most secure investments in the world. The capital value is not affected by inflations or depressions, whereas myriads of industrial and financial institutions are wiped out in such times. The income also is highly flexible. In a time of low timber prices, the timber can be simply left uncut, as it is in state and private forests today throughout Europe; but this *uncut timber* unlike a shut down factory, stores up income continuously, because the trees are growing. When prices are high, this stored-up income can be collected by cutting—and more, too, since periodic overcuts are always allowable in good forestry. Moreover timber prices will probably continue to rise slowly, for the irrefutable reason that only fifteen per cent of the world's forests are managed for new crops, and the devastation of the others will constantly increase the demand for and the price of cultivated timber.

Really, it is a terrible pity that foresters have spent so much energy in discouraging forest owners and themselves from practicing sustained yield forestry. This is especially true in America, where the conversion of the magnificent virgin forests to sustained yield can only be worked out by faith, vision, intelligence, and courage. If foresters do not apply

these qualities to the problem, who will? Fortunately many foresters are applying these qualities, and more will do so as the facts and possibilities become better understood.

4. *Private forest ownership is, from the public standpoint, highly questionable, according to Mr. Richards. A leading European forester, the late Dr. Schwappach, of Germany, said that it would be better if there were no private forests and they were all state-owned.*

This, of course, is a debatable question on which everyone is entitled to his opinion. Other leading authorities on forest policy, such as Dr. Endres of Munich and Dr. Weber of Freiburg, can be quoted in favor of a goodly proportion of private forests. In fact, it may be said that the consensus of competent opinion in Germany leans to the view that what is needed is a correct *balance* between private and public ownership and that private forestry is an indispensable part of the whole national forestry enterprise.

The origin of the idea that forestry is only suitable for the state is not difficult to trace. In the first place, the fact that the individual tree outlives the individual man led to the belief that only a permanent, continuing agency — namely, the state—could do the long waiting supposed to be involved in forestry. We have shown above that this time element in sustained yield forestry is an illusion. Moreover, there are private forests in Europe that have been in the same family for upwards of seven centuries. In the second place, most forestry literature, both in Europe and in America, has been written by government-employed foresters and it is only natural that these men should favor the type of ownership they themselves represent. Thus both the advantages of state ownership and the disadvantages of private ownership have been exaggerated. Many American forest owners, fighting against limitations on private property rights, have skilfully turned these arguments with telling force against the whole forestry movement. There is no *single* solution of the forest problem. We need a campaign waged simultaneously on all fronts.

5. *The attempt to promote private forestry as a business enterprise in America is a "subtle poison" that has undermined the whole forestry movement, according to Mr. Richards. This attempt should be scrapped in favor of a huge program of public forest acquisition.*

No one will dispute the need of a very far larger and better organized program of public forest purchase in America. The present program of almost exclusively federal acquisition could well be replaced by a very much larger program of cooperative federal-state-county acquisition. But how fast can such a program go forward? Who will furnish the cash?

In twenty-two years the federal government has purchased less than five million acres. Suppose we greatly increase the rate of purchase and say that in the next twenty-two years the federal-state-county program will bring fifty million acres or a hundred million acres more to the public. That seems a fairly generous estimate. What will happen then to the remaining three hundred odd million acres in private ownership? This question is all the more pertinent because it seems likely (in fact Mr. Richards advocates) that the acquisition program will be concentrated on the already devastated lands that are being abandoned by their owners to escape the payment of taxation. Well, then, in that event unrestricted devastation on a colossal scale is to go forward, without let or hindrance, in our only remaining valuable forests—namely, those that already bear timber and can be converted to sustained yield! And upon hundreds of millions of acres of them!

The really "subtle poison" in the American forestry movement has been the fixed idea that nothing can be done to stop forest devastation and that the only

other alternative is an immense program of public acquisition that even its most ardent advocates realize is a financial and political impossibility.

The idea of promoting forestry in America is not at fault. But the ways and means chosen to that end have been at fault. The whole movement has been unorganized, spasmodic, and without adequate leadership. Its aims can be achieved only by gruelling intellectual and imaginative work. The forest owners themselves are crying for relief from the intolerable financial burden of carrying their huge reserves of mature timber. Here are the elements for a first-class bargain. Let the United States Government say: "Very well, I can and will help you carry this intolerable burden through the medium of organizing cheap credit and in other ways. But in return I shall take steps, under federal supervision, to end devastation. Henceforth you private owners shall be trustees of a great national resource and you will handle it in a way that is not inimical to generations of American people."

Is this a pipe-dream? At the moment this article is being written, the United States Congress is engaged in a two-billion dollar project to refinance, at low interest rates and on long terms, the mortgages of our ruined farmers. Is it impossible to refinance the timber-holdings of our ruined forest-owners, at the same time giving the government the power to prevent further devastation? Or shall we foresters—in this age of revolutionary daring and change, when the old order, having crumbled away, must be rebuilt—shall we sit aside in cloistered recesses and dispute over the mystical metaphysics of academic forestry?

We are in a period of unparallelled economic, social, and spiritual flux. Now is the time for courage and action. And now if the foresters and the timberland owners will summon courage and imagination, they can set the whole forest enterprise on the road to being one of our great, permanent national possessions. The time is suddenly ripe to recapture the large vision and the heroic daring of the early forestry movement. If the creation of the national forest system is the greatest monument to Theodore Roosevelt, let the creation of a larger system of sound private forest management be the greatest monument to Franklin Roosevelt. Endless, ever-green, ever-living monuments!

AMERICAN FORESTRY—A PROBLEM IN RELATIVITY

By E. A. SHERMAN

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This author presents an interesting, although perhaps not convincing, argument that American forestry policy cannot be compared with Sweden's because of the differences in size and other conditions, of the two countries.

BOYS in school are sometimes asked, "How big does the setting sun look to you?" "Considering its distance from the earth it is equivalent to how large an object held at arm's length?" Answers to these questions usually vary from a wagon wheel to a silver dollar. Try it yourself; shut one eye and hold a round object at arm's length between the other and the sun. A plump garden pea so held will blanket the disk of light.

Soundness of judgment depends to no small extent upon the accuracy of the individual's sense of proportion and the correctness of his perspective. Variations in perspective and sense of proportion have doubtless been the origin of more differences of opinion among professional foresters on questions of a forest policy for the United States than any other one cause.

The country is so vast and diversified that the one simple fact of physical proportion is overwhelming. This is further complicated by physio-graphic diversity. Both are in turn still further complicated by diversity of economic interests. These are made still more intricate by differences in characteristic traits of their local population. Finally, over all this is thrown the complexities of our system of government which unites in one federal entity as a nation, 48 separate sovereign states.

Human history contains no precedent for such a system of government applying to such a vast region. Our great extent of territory and wide diversity of interests caused us to resort to an unusual system of government in order to secure national action on national matters while providing for local variations to suit local preferences. In this field of government we have been a pioneer. This nation has therefore had no counterpart to follow either as an example to avoid or a model to emulate. We have had to create our own model, drawing upon our own ideals of fitness.

As a pioneer there has been little in the way of practical examples by other nations to serve us as a guide. It is seldom that in any matter we can turn to the example of some other country as a model to be followed. Sometimes, it is true, the work of other nations provides examples of trends or policies that are desirable or undesirable for certain limited portions of our country, but never do they furnish us governmental policies which can be applied in the United States generally to such a problem as forestry.

Sweden is a country which is referred to frequently among professional foresters as furnishing an example for this nation to follow. Comparisons are always fraught with hazard to the footsteps of the diplomatic unwary. None will be made here that will be to the discredit of the gallant little Baltic nation. It is part of its good fortune that it has a compactness of area, a unity of race and interest, and a simplicity of physiography that saves it from many perplexing difficulties which are encountered in a region of greater diversity.

If the forest problem of this nation were reduced to the simple elements it presents in Sweden our troubles would be relatively easy of solution. To present the situation in understandable perspective it is necessary to consider Sweden as a whole in contrast to parts of our nation comparable in size. In other words, mental adjustment is indispensable.

In Table 1 we have comparable data for Sweden and fourteen units of comparable size carved from the states, some units smaller and some larger. This arrangement is not intended to indicate comparative importance or order of importance of any of the units enumerated. Any such suggestion would not be in good taste.

There is, however, no such taboo against calling attention to the great diversity of conditions represented by the fourteen different groups of states. This diversity of conditions gives to our forest problem as a whole a complexity which is not approached by that of any one group and is naturally unknown to any single region of comparable size and unity, such as the Kingdom of Sweden, which has no such flood problem as that presented by having to provide drainage for the great Mississippi River basin through a single river channel past New Orleans, or such problems as are presented by our forested mountains in the semi-arid West, or the Pocoson and Titi swamps of the South and Southeast, with land reclamation by irrigation or drainage important dependent problems in each case. Of course, it does not follow from this that we have nothing to learn from Sweden or other European nations. On the contrary there is undoubtedly much to be gained from the experience of other regions. The point is that the successful use of a given method in solving a relatively small and simple problem is far from proving that the same method will work successfully with a larger and more complex problem.

TABLE 1

COMPARABLE DATA FOR SWEDEN AND CERTAIN GROUPS OF STATES

Region	Total land area millions of acres	Area of forest land millions of acres	Population (1930 U. S. Census)
Sweden	110	62	6,120,080
Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Delaware	105	51	34,665,471
Ohio, Indiana, Illinois, Iowa	120	10	19,986,793
Minnesota, Wisconsin, Michigan	123	59	10,345,284
Maryland, West Virginia, No. Carolina, Kentucky	105	56	11,567,447
So. Carolina, Georgia, Florida	92	72	6,115,482
Alabama, Mississippi, Louisiana, Tennessee	121	65	9,374,218
Arkansas, Missouri, Oklahoma	122	50	7,879,889
Kansas, Nebraska, No. Dakota, So. Dakota	195	5	4,632,656
Idaho, Montana	147	40	982,638
Colorado, Utah, Wyoming	171	30	1,769,203
Texas	170	33	5,824,715
Arizona, New Mexico	151	29	858,890
California, Nevada	170	25	5,768,309
Oregon, Washington	104	36	2,517,182

CLIMATIC CHANGE AS A FACTOR IN FOREST SUCCESSION[1]

By PAUL BIGELOW SEARS

University of Oklahoma

This article calls to the attention of foresters the use which may be made of pollen in peat bogs for dating forest vegetation and is of unquestionable interest in studying broader aspects of forest succession.

MANY important inferences concerning the character of postglacial vegetation and climate are now at hand. Interesting in themselves, they are also of use in interpreting the present pattern of plant communities in eastern North America. One who is acquainted with the native vegetation in any part of this region must appreciate the difficulty of explanations based upon existing topography, soil or climate. To a great extent this difficulty may be lessened if such factors are understood in terms of their continuous operation throughout the recent geological past.

In general it may be said that the sequence of postglacial climate already demonstrated for northern Europe seems to have prevailed in eastern North America. (21) The retreat of the ice was probably accompanied by a marked drying of the atmosphere. Such drying seems to have produced a widespread area with continental climate. The continental climate appears at first to have been cool, later warm—warmer even than the present. There is evidence for a humid interval between the cool dry and warm dry phases of this continental climate. There is also reason to believe that the present is cooler and more humid than the warm dry period from which we are emerging. Table 1 summarizes these changes.

It will be noted from the table that it has been possible to assign approximate dates to the different types of climate. These dates agree fairly well with those obtained in Europe by the use of more exact methods than are yet available to us. (12, 27.)

The older conception of postglacial climate pictured it as a gradual warming which resulted in the melting and retreat of the ice. Students of glaciation, however, no longer agree on temperature as the only factor responsible but include dessication as well. The length of postglacial time is believed to be not more than twenty thousand years. This is less than half the length of the older estimates. It is known for example that the Niagara gorge, whose rate of cutting has long been used as a measure, was cut back through soil instead of solid rock. (14) This permits us to accept the shorter estimates based upon measurements of various kinds and greatly increases the likelihood that shifts in climatic conditions during this period may have produced effects which are still visible.

Because the area under consideration is so large and varied, general statements about the changes which have occurred must be carefully made. Taking, however, the southern Great Lakes area as

TABLE 1

POSTGLACIAL CLIMATE, EASTERN NORTH AMERICA

Climate	Year	Date
Cool humid	—0	1900 A.D.
Warm dry	—3300	1400 B.C.
(?) Humid	—6000	4100 B.C.
Cool dry	—7300	5400 B.C.
Cool humid	—10500	8600 B.C.

[1]Contribution from the Botanical Laboratory of the University of Oklahoma, n. s. 23.

an example the course of forest history seems to have been somewhat as follows:(21)

First, ice. Second, forests of spruce and fir. These may have been preceded by tundra, but if so the tundra has left scant trace in the form of microfossils. Although the existence of a tundra stage as inferred by Adams (1) seems reasonable, the studies of Cooper (7) along the Alaskan glacial front seems to show forests may follow rather closely upon the retreating ice. Transeau,(23) Dachnowski(8) and others incline to regard bog communities as relics of a former continuous tundra. In many places the bog communities have developed late in the history of filled lakes—and may thus be recent rather than persistent.

The third stage was characterized by extensive forests of pine with hardwoods entering towards the south and west. This pine period reached its best expression about 6000 B.C. and passed into a condition characterized by an increase of hemlock and beech before 4000 B.C. It is this hemlock-beech period which is considered to be a humid interval separating the cool dry pine climate from the subsequent warm dry oak-hickory period. It must be admitted that the pine forests might have passed on into white pine-hemlock and beech in the normal course of succession without much climatic change. If we could be certain that the pine period remained quite cool until the advent of the more mesophytic community, we would be obliged to regard the latter as representing a climax condition. However the slow increases of hardwoods during the pine period indicates that warming was already under way. This of itself would produce a decrease in relative humidity decidedly unfavorable to a succession ending in beech and hemlock. We are personally inclined therefore to think that there was an actual increase in atmospheric humidity toward the end of the pine period.

The fourth distinct period was characterized by a disappearance of conifers, waning of beech and the increase of oak-hickory with considerable grassland toward the south and west. Specifically, the vegetation of Ohio at that time was probably an open savannah of prairie, oak and hickory. These conditions persisted until after 1500 B.C. at which time the westward retreat of the grasslands and oak-hickory began.

Since that date there has been an increase in the more mesophytic forest species which characterize the fifth period. The question may properly be raised here as to whether this increase in beech and other species requiring humid conditions was not merely the result of succession under an unchanging warm dry climate. As a matter of fact, spruce, fir and hemlock have been on the increase in southeastern Canada, northern Michigan and Wisconsin during the past 3,000 years. Oak and other deciduous trees have shown a corresponding retreat from the north during this same time. It seems reasonable then to infer cooler and at least relatively more humid conditions since 1500 B.C. This agrees well with the recent southern movement of forests in northern Europe.(11.) It also coincides with the invasion by conifers of areas in the lower Alps known to have been occupied by deciduous forests in the past.(11) We have thus a close parallel between the postglacial cycle of climate and what is known of the interglacial cycles in which return of the ice was presaged by a southward movement of conifers. It is evidence of this sort which has been used by Erdtman (9) and others in Europe to predict that a readvance of the polar ice cap may be expected perhaps in not more than ten centuries.

The foregoing statements may be summarized in tabular form. (Table 2).

The Effects of Climatic Change on Vegetation

Assuming that this outline of climatic changes is reasonably correct, how has it affected the present pattern of plant communities? In the first place, it is unlikely that a change of climate will affect all types of habitat equally. We have very little data showing the influence of climatic conditions over long periods of time. Lyell (17) mentions the fact that citrus groves grew in Georgia for nearly a hundred and fifty years before being killed off by frosts. The effect of occasional dry years in Ohio and Indiana is disastrous to beech trees at the forest margin. In Oklahoma steep canyons with sandy soil and abundant seepage water have permitted the survival of communities of sugar maple in the midst of a severe grassland climate west of the 98th meridian. Bunch-grass, cactus and yucca are found at the canyon rims. This disjunct lies nearly 200 miles west of the climatic limit of the sugar maple. It has been interpreted by us as a survival of the humid period of 4000 B.C., if not indeed of an earlier moist climate.

Diversity of topography or physical and chemical conditions in the soil may serve both to intensify and moderate the effect of climatic factors. Wind and sun exert full force upon uplands but not within ravines. The two sides of a ridge do not experience the same impact of atmospheric factors. (6). Where moisture is abundant the chemical differences between soils may assume considerable importance. Chestnut is practically restricted to sandstone in Ohio (19) and many similar instances are familiar. Where moisture is less abundant the physical effect of sandstone soils is perhaps more important than their chemical influence. Upland forest may extend into the grasslands on outliers of sandy soil while the adjoining clay is prairie. This appears to explain the cross timber areas of Oklahoma as well as certain upland forests of oak and juniper near the canyons previously mentioned. (See Figure 1.)

Table 2

POSTGLACIAL VEGETATION, NORTHERN OHIO

Year	Vegetation
—0	Deciduous forest
—3300	Savannah
—6000	Deciduous forest
—7300	Pine
—10500	Spruce-fir

Thus, even under uniform climatic conditions soil, topography and vegetation exhibit great diversity. But physiography holds that surface processes tend to produce uniformity by base leveling. Likewise, soil science indicates that soil profiles throughout a given climatic area tend to approach greater uniformity with the passing of time. Studies in plant succession suggest that numerous diverse pioneer communities tend to be replaced by more uniform, stable ones in the course of succession. Thus three great bodies of scientific doctrine emphasize the tendency of habitat and vegetation to approach uniformity and stability with the passage of time.

The actual picture is far different. We are of course handicapped by the lack of adequate maps of natural vegetation but if we take a map of integrated climatic patterns and trace upon it such vegetation maps as we have, we are generally disappointed at the poor correlation obtained. Furthermore, the problem is complicated by the fact that the communities throughout a given region of essentially similar climate may exhibit diverse geographical relationship. Communities which appear to lie outside their normal geographical range are variously explained as relics, invasions or accidents.

It is true that the processes of base-leveling, and biotic succession are orderly, as Adams (1) suggests. So is the process of soil development. But the three sel-

dom proceed synchronously to the point of convergence. The earth's surface is of too heterogeneous a character. All three processes are profoundly influenced by climate, and we have seen that climate itself changes. It is not surprising then that we so seldom see the uniformity and equilibrium which theory leads us to expect.

A knowledge of climatic changes during the past 10,000 years may not so much simplify as make rational the picture of vegetation. If the influence of a constant climate may be very uneven because of local conditions it is reasonable to believe that the influence of a changing climate does not operate evenly. In Ohio (19) there are at least five notable types of habitat in which western communities of plants occur: (a) thin-soiled, limestone outcrop (b) tight packed clay of ground moraines, evidently ponded long after glacial melting (c) overdrained gravel outwash of considerable thickness (d) exposed hilltops such as those described by Miss Braun (4) for southern Ohio (e) sandy oak openings (8).

Communities of northern vegetation in the same area are found principally in bogs and deep ravines. As stated before the predominantly northern conifer forest which persisted in the state until about 6,000 years ago was followed after an interval by savannah conditions of prairie and oak-hickory, typically western. We have explained that these latter conditions have apparently been on the wane for the past 3,000 years due to an increase in moisture and presumably a lowering of temperature. Whether northern and western plant communities actually occupy today the same terrain as during their appropriate climatic conditions is of course difficult to say. It is hard to see how remnants of northern communities could persist on a very wide scale through the xerothermic period with its western vegetation. Certainly there are thick seams of peat formed after the coniferous period which show little or no trace of boreal vegetation until its recent recurrence. Hemlock may, of course, have remained continuously in the deep ravines where it is found today. But it must be remembered that bog and hemlock communities are both as notable for their acid perference as for their northern floristic affinity.

Evidently the term "relic" must not be taken in too literal a sense. This is particularly true of plants representing a type of climate which has been long absent from an area. Yet the possibility of long continued local persistence of species and communities has been shown clearly by the studies of Fernald (10) and others. We may be sure that a series of changing climates has introduced into the eastern part of the United States communities of very different floristic compositions. The present vegetation pattern is thus in a large degree the complex result of the uneven effect of subsequent

Fig. 1.—Upland forest of oak and juniper, Caddo County, Oklahoma. This occurs on sandy soil in a typical grassland climate.

changes in climate. These changes may have resulted in preserving past communities intact. On the other hand, past communities may have persisted but have been obliged to shift location and in that sense compete with the present flora. Or communities long absent may be returning to suitable habitats. On the whole it is decidedly safer to regard the prairie areas of Ohio as relics in the strict sense than to so treat the communities of northern plants whose appropriate climate suffered such a profound disturbance during the warm-dry period which culminated about 2000 B.C.

The Evidence for Climatic Change

The study of postglacial climate has made earlier and more rapid progress in Europe than in America. The relative number of workers there has been larger, the area more restricted, the vegetation better known and perhaps simpler. When the glacial theory was accepted, a change of climate from cold to temperate was taken as a matter of course. In northern Europe (6) a happy combination of fossil remains with floristic and faunistic evidence soon revealed the existence of a xerothermic or warm dry postglacial climate. In 1881 Blytt announced and designated a series of postglacial climates as follows: Arctic, Sub-Arctic, Boreal, Atlantic, Sub-Boreal and Sub-Atlantic. (Table 3):

Table 3

POSTGLACIAL CLIMATE, NORTHWESTERN EUROPE[1]

Date	Period	Climate
(DeGeer)	(Blytt-Sernander)	
1000 A.D.	Sub-Atlantic	Cold moist
1500 B.C.	Sub-Boreal	Warm dry
3500 B.C.	Atlantic	Warm moist
3500 B.C.	Climatic optimum	
6000 B.C.	Boreal	Warm (?) dry
8000 B C.	Sub-Arctic	
9500 B.C.	Arctic	

[1]After Woodhead (27).

This sequence received the attention of Sernander from 1890 on and has since been known as the Blytt-Sernander hypothesis. With the announcement in 1915 by Von Post (11) that fossil pollen could be used as an index to postglacial forests a means opened up for critically testing the ideas of Blytt and Sernander. For northern Europe the method of pollen analysis resulted in a remarkable confirmation of their theory. However, in extending the method to the remainder of Europe certain difficulties appeared. The prestige of the theory made it a bed of Procrustes into which the facts from all of Europe had to be fitted. This accounts for much of the confusion which one encounters in attempting to understand and reconcile the results of pollen analysis from central and southern Europe. Moreover, certain workers have treated the periods of Blytt and Sernander as general measures of time while others have regarded them as terms for widespread types of climate. In either case a prejudgment is likely to result. The proper method would seem to be to investigate each locality independently and allow the final results to speak for themselves. This has been done with notable success in several of the European areas.

In North America methods have been freely borrowed from Europe, but the initial suggestion which led to the unraveling of postglacial climate appears to have been due to Asa Gray. (13) He clearly recognized the problem of shifting floras and the importance of survivors or relics as pictures of past conditions. The presence of boreal communities in the southern part of the glaciated area has long been regarded as a case of relic floras and communities. In 1923 Gleason (13) attacked the problem of western communities of prairie plants persisting in Eastern North America. Gleason also

traced the recent changes at the boundary of prairie and woodland and concluded that North America is emerging from a period of widespread continental or warm dry climate. After a considerable delay workers in this country began to utilize the possibilities of fossil pollen studies as a means of tracing postglacial climate. The able work of Wodehouse (26) on pollen morphology has greatly facilitated this undertaking.

It is well known that many of the dominant plants in forest and prairie are wind pollinated. Many of these plants produce pollen in such abundance that its accumulation is an important phase of lake and bog filling. It is also of course understood that conditions in bogs are so antiseptic that much of the material deposited in them is fairly well preserved. Human remains for example are known to exhibit remarkable preservation after a lapse of 15 centuries.(5) Small amounts of bog deposits collected in order and suitably mounted reveal through the microscope the kinds of pollen which have been blown into the peat at successive intervals. It might be expected that the proportion of these pollens would fluctuate in erratic fashion but such is

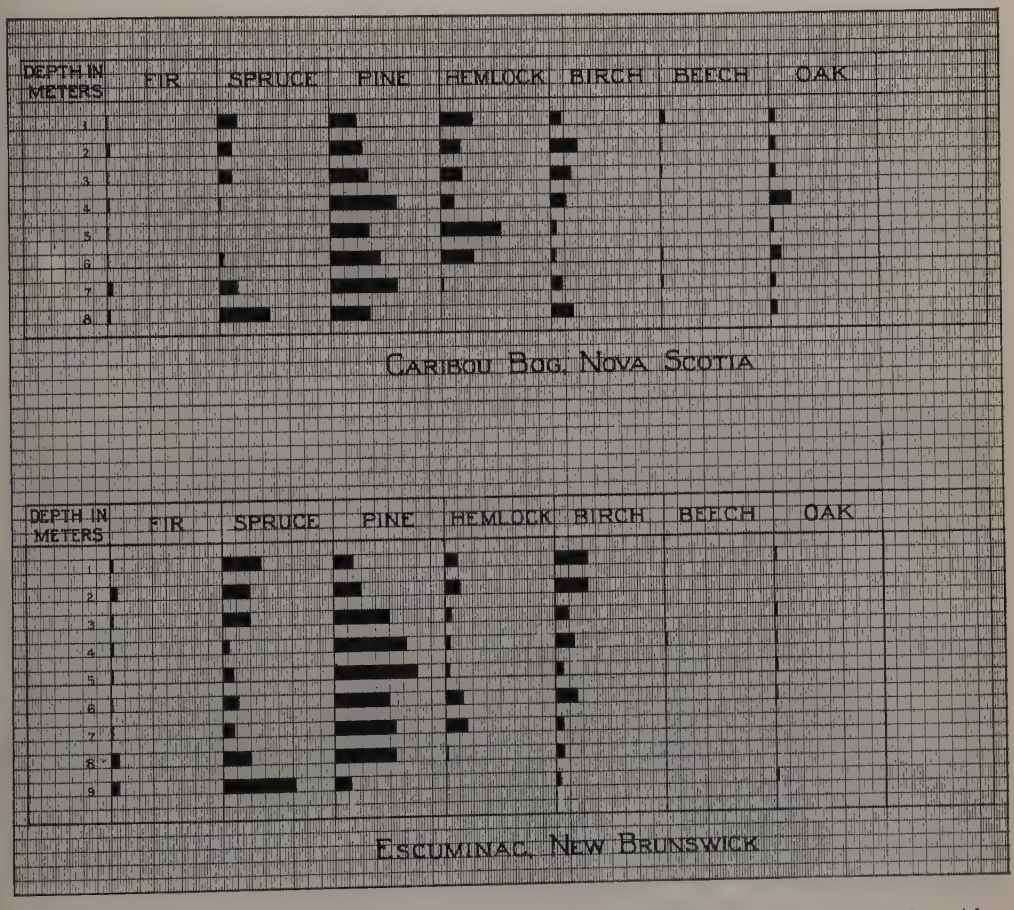

Fig. 2.—Percentages of various pollen at sucessive depths in past, southeastern Canada. After Auer (2). Changing percentages suggest changing climatic conditions. Not especially maxima for hemlock.

not the case. Determination and counting yield percentages showing consistent changes over long periods of time. This may be seen in the graphs, figures 2 and 3, which represent the result of several counts in Canada and the United States. Interpretations based on the graphs in Figure 3 are set forth in Table 1.

In North America Auer (2) has made rather extensive studies for the Canadian Geological Survey of the peats of southeastern Canada, Lewis and Cocke (16) have published a report on the Dismal Swamp, Bowman (3) on a bog in Quebec, Voss (24) a preliminary report on a Wisconsin and an Illinois deposit. Other investigations are under way. The Botanical Laboratory at the University of Oklahoma with assistance from the National Research Council and the University of Michigan has investigated deposits extending from Arkansas north to Iowa, eastward through northern Michigan and down to central Pennsylvania. The most detailed studies are centered about the Ohio-Michigan-Indiana area. Lewis and Cocke as well as Bowman have refrained from drawing conclusions as to climatic change. Auer believes that his findings agree with those obtained in Europe, a re-

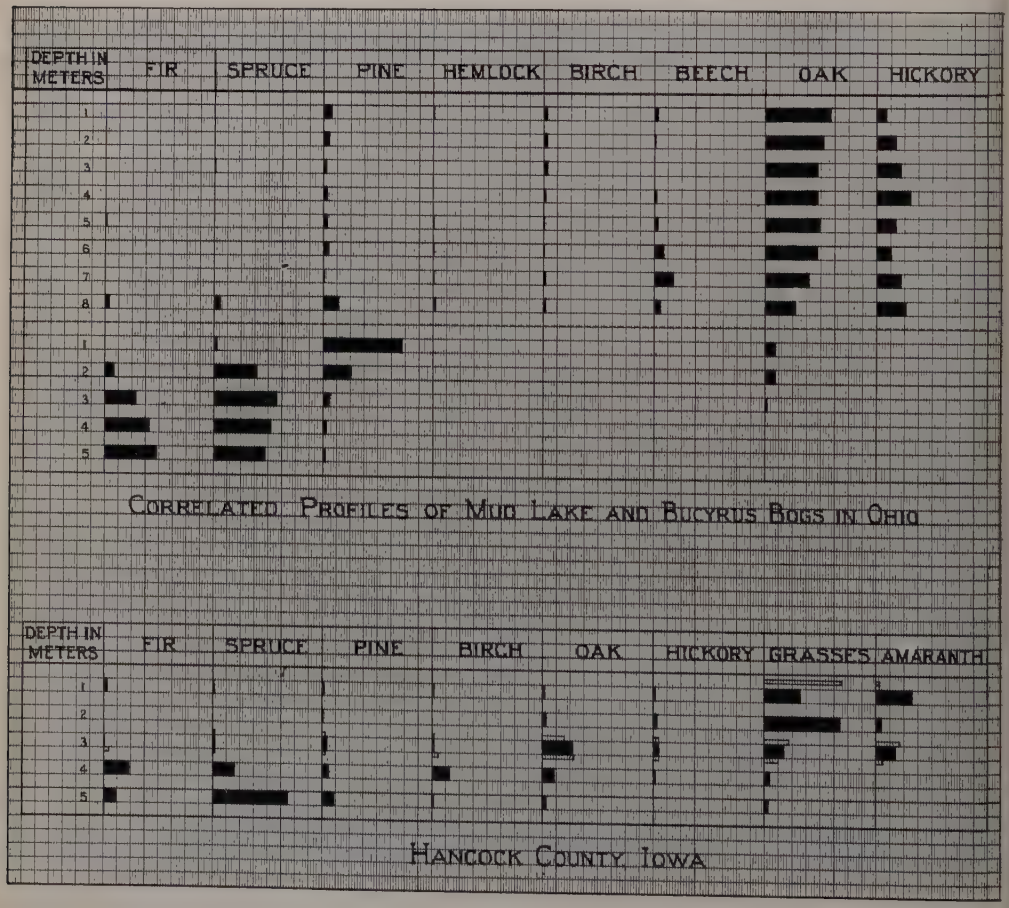

Fig. 3.—Percentages of various pollen at successive depths in Ohio and Iowa. For citations consult (21). Note especially maxima of pine, beech, and hickory in Ohio profile.

sult which the analysis of his figures seems to confirm (Figure 2). The studies of the Oklahoma Laboratory have arrived at a similar result (20). Finally, we have made a begining on the important matter of chronology (22). By a combination of methods which includes tracing the depth in peat of spruce needles of known age, we have been able to assign a conventional rate of about 25 years per inch or 300 years per foot for average peat in the Ohio-Michigan Area. This estimate forms the basis of the chronologies tabulated in the first section of this paper, which agree in general with those from Europe based on clay varves.

Summary

Two strongly marked dry periods have occurred in postglacial time, the first cool, the second warm. It seems likely that an interval of considerable humidity separated them, and that the recent warm dry period has been for some time passing into a cooler, moister phase. Existing vegetation then must represent a composite of communities which have developed in direct response to the present climate along with survivals of the earlier climatic conditions outlined.

These conclusions are based on the record left by fossil pollen in peat which affords an important clue to postglacial conditions. This record confirms and extends the results of floristic and paleontological studies. Thus it enables us to interpret the present forest pattern of eastern North America in terms of the impact of successive climates whose effects have not operated uniformly nor persisted equally in all types of habitat.

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EFFECT OF WEATHERING UPON COMPOSITION OF HARDWOOD LEAVES

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IN CONNECTION with an experiment pertaining to the amount and composition of the annual litter deposit in hardwood forests, it was found desirable to know what nutrient materials are removed from the leaves during their first month or two on the ground. Although other investigators have made a great many analyses of leaves taken from the tree at different stages of growth and, in the case of conifers, on one, two and three year old needles, no work has been reported to the writer's knowledge dealing with the natural losses in mineral constituents and nitrogen occurring immediately after leaf fall.

The nearest approach to a study of this kind was cited by Ebermayer (1) in which he stated that Schröder had leached freshly fallen beech leaves with distilled water, and obtained losses as follows:

Fe_2O_3 (Ferric oxide)	1.5 per cent
CaO (Calcium oxide)	4.5 per cent
MgO (Magnesium oxide)	19.6 per cent
P_2O_5 (Phosphorus pentoxide)	19.7 per cent
K_2O (Potassium oxide)	52.6 per cent
SO_3 (Sulfur trioxide)	55.3 per cent

Ramann (3) states that most of the ash constituents of forest litter are in a readily soluble form but he gives no detailed data.

Therefore, in an attempt to throw some light upon the question, preliminary studies were made by the writer during the fall of 1932.

Procedure

Certain trees were kept under observation and when leaf fall was well started the writer picked yellowed or browned leaves directly from the tree and some from the ground, in the latter case only those leaves which had dropped not more than a day or two previously. The leaves were put into two bags, equal distribution being obtained by putting alternate handfuls in each bag.

When sufficient material had been collected, one bag was emptied on the ground under the tree and the contents spread uniformly over an area of about nine square feet. To prevent blowing a piece of 2-inch mesh poultry netting was laid over the leaves and staked at the corners. The other bag was taken to the laboratory and the contents allowed to air dry.

After seven to eight weeks the samples under the trees which had been exposed to the weather, were collected and dried. Both the unweathered and the weathered samples were then subjected to chemical analysis.

The trees selected for this study (one tree of each species and the periods of weathering were as follows:

Shade trees surrounded by lawn on Station grounds, New Haven: Shagbark hickory (*Carya ovata*) October 18-December 6 (7 weeks); White oak (*Quercus alba*) October 27-December 22 (8 weeks).

Forest trees in one block of the Eli Whitney Forest, Hamden: Beech (*Fagus grandifolia*) October 22-December 10 (7 weeks); Sugar maple and red maple[1] (*Acer saccharum* and *A. rubrum*) October 25-December 13 (7 weeks).

[1]The maple leaves were nearly all picked from the ground. Equal amounts of each species were taken.

Results

The data presented in Table 1 show that weathering increased the relative ash content somewhat in all species except the beech. It caused a slight relative increase in nitrogen, but it had practically no effort upon calcium. The potassium content, however, was decreased by about 75 per cent; and phosphorus in variable amounts ranging from 12 to 52 per cent. While the loss of potassium was to be expected, the relatively large loss in phosphorus was surprising. The results are, however, in agreement with those of Schröder.

Unfortunately no data were taken on the loss in dry matter. Perusal of the literature reveals only experiments carried over longer period of time and in an artificial environment. Ramann (3) cites two experiments, one in which 500 gms. of oak leaves in a rain gage decreased to only 225 gms. after 1 year, and to 135 gms. in two years, the losses being 55 per cent and 18 per cent respectively. The second experiment had to do with 200 gm. of beech leaves which, after 6 months weighed 124.7 gms.; 12 months, 75.5 gms.; and 18 months, 47.6 gms. or 37.6 per cent, 24.6 per cent and 13.9 per cent respectively. Falconer, Wright and Beall (2) determined in situ the loss in weight of the combined F and H layers of white, red and jack pines during the period from June to September. The losses they obtained varied from 6.5 to 15 per cent. These results, while interesting, are not applicable to the immediate problem.

Later it is hoped to repeat the experiment on a somewhat larger scale and it will include data on the loss in dry matter. These studies were not of sufficient scope to permit any broad generalizations relative to the comparative losses in different species. The data obtained clearly indicate, however, that the composition of hardwood leaves, particularly the phosphorus and potassium content, changes rapidly after they have fallen to the ground. If any comparisons of species or of sites is to be made on the basis of fresh leaf litter, the samples should be collected direct from the tree or immediately after the leaves have fallen.

The losses noted above are brought about primarily through the leaching effect of rains. Biotic decomposition as such had hardly started at the time of collection. Presumably the leached substances are not immediately lost to the soil but rather absorbed by the underlying humus and mineral soil. The writer has recently installed some lysimeters which, it is hoped, will provide means for determining accurately just what and how

Table 1

Effect of weathering upon the composition of forest leaves calculated to water free basis

Description	Ash per cent	Ca per cent	K per cent	K Loss per cent	P per cent	P Loss per cent	Total N per cent
Station grounds							
Hickory, not weathered	9.36	2.03	.990		.157		1.106
Hickory, weathered	10 63	2.02	.244	75.4	.139	11.6	1.160
White oak, not weathered	5.71	1.36	.511		.125		0.674
White oak, weathered	6.02	1.40	.162	68.2	.072	42.4	0.715
Eli Whitney Forest							
Beech, not weathered	5.49	0.87	.765		.162		0.706
Beech, weathered	4.90	0.88	.153	80.0	.078	51.8	0.776
Maple, not weathered	5.57	1 12	.523		.098		0.416
Maple, weathered	6.14	1.17	.128	75.5	.054	44.6	0.541

much materials are leached from forest litter, and to what extent these leached substances are absorbed by the soil.

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Oregon Grown Slash Pine Seed

It is a far cry from Florida to Oregon, yet planted stock of slash pine, (*pinus caribaea*) is doing well in the Peavy Arboretum near Corvallis, Oregon. During the winter of 1932-33 these planted pines were exposed to a low temperature of +9° F. and freezing weather was experienced for almost 60 days. This severe cold killed all the Pinus radiata in this region, about 90 per cent of the Cryptomeria japonica elegans, and injured and killed many other trees and shrubs. Approximately one-half of the small plantation of slash pine was killed due to this unusual weather. This kill was not in groups but by scattered trees. This would seem to indicate that this tree possesses considerable individual resistance to low temperatures. Of the remaining trees which, incidentally, have grown at the rate of 2 feet per year, several matured cones. These cones were carefully dried and the seed extracted. By the cutting test, these seed appear fertile.

Whether the resulting seedlings will be more cold resistant than their forebearers is problematical, as the male parent very likely was one of the trees killed by the cold. However, when the next crop of cones matures, both parents will be those that have passed through the 1932-33 cold period and should produce a hardy strain of slash pine.—*T. J. Starker, Oregon State College.*

GROWTH RATE OF WHITE PINE IN THE SOUTHERN APPALACHIANS AND NEW ENGLAND

By J. T. KIMBERLY

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IT IS generally known that white pine (*Pinus strobus* L.) grows more rapidly and to larger dimensions in the southern extremes of its range. Cope[1] stressed the greater size and growth rate of white pine in the southern Appalachians as compared with New Hampshire. It is the purpose of this paper to indicate by presentation of additional field measurements what may be the difference in size.

The south is represented by white pine growing on the Cooper Creek watershed in the mountains of northern Georgia; the north, by trees on the Yale Forest at Keene, New Hampshire. These two localities are for practical purposes at the northern and southern extremes of this tree's botanical range. The complex of site factors at each locality is distinctly different and contrasting; the size of the trees reflects these differences. White pine occurs in greatest abundance on the best sites at Cooper Creek but at Keene it usually occurs on the medium to poor sites.

Trees for measurement were selected at random, distributed over the entire range of sites and types that occurred in each locality. At Cooper Creek the comparatively small and scattered stands necessitated a wider territorial distribution to cover this range than at Keene. All trees selected were second growth. The same procedure, instruments, and methods of measurement were used on each area, and in every case the tree selected was either dominant or co-dominant. Increment borings were taken at breast height, the total age at this point being used as the basis of comparison. The data were averaged by ten-year age classes and curves plotted.

Figures 1 and 2 present the data in graphic form. It is evident that growth both in diameter and height are greater at Cooper Creek than at Keene.

The data were subjected to statistical analysis and the conclusion reached that the differences in height and diameter between white pine at Cooper Creek and Keene are significant. Table 1 shows the statistical measures computed.

TABLE 1

DIFFERENCE IN HEIGHT AND DIAMETER

	Cooper Creek	Keene	Cooper Creek	Keene
Basis (no. trees)	345	345	61	68
	Inches		Feet	
Arithmetic mean	15.3	11.9	78	55
Standard deviation	4.5	3.78	20.1	16.2
Standard error	2.83	2.04	8.9	5.2

[1]Cope, J. A. White Pine in the Southern Appalachians. Jour. For. 30:821-828.

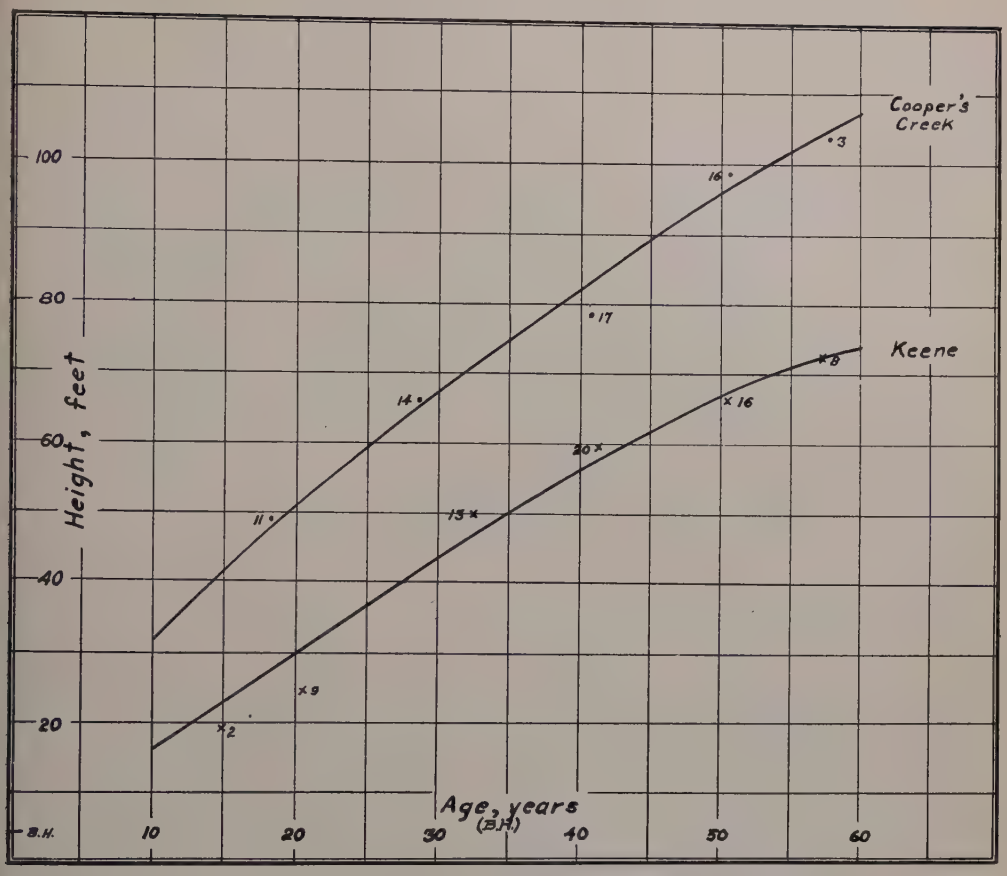

Fig. 1.—Curves of height on age.

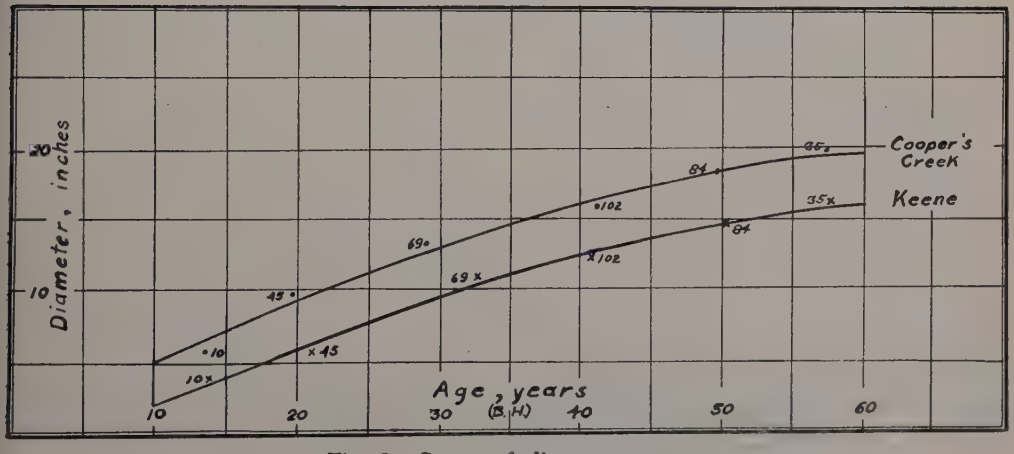

Fig. 2.—Curves of diameter on age.

AN ESTATE FORESTRY PROJECT

By L. W. RATHBUN and R. D. STEVENS

In September, 1932, the New York and New England Sections of the Society held a joint meeting in Poughkeepsie, N. Y., and the vicinity. On the afternoon of the second day the hundred odd members in attendance were received informally by Franklin D. Roosevelt, then Governor of New York, at his home in Hyde Park. In his talk to them he stressed the difficulties confronting a small forest owner like himself whose acreage is too limited to permit the overhead cost of a full-time forest manager who would be competent to plan, and direct the cultural and cutting operations and at the same time could keep in touch with the timber and wood markets so as to be able to place to the best financial advantage the annual production from the property. He suggested the possibility of a coöperative organization whereby a group of forest owners of his class might pool their interests, bringing together under one management a sufficiently large acreage to justify the fixed minimum overhead charge of competent supervision. Since then the N. Y. State College of Forestry has been working on the idea. It has given out a succession of news releases reporting the progress it has been making. The two authors of this article have had six or seven years' experience along similar lines in southern New Hampshire. Their conclusions as to what form of organization is practicable, and how to go about developing it, should be of value to foresters in other forest regions where the ownership is comparably subdivided.

ENCOURAGED largely by the development of the Keene Demonstration and Research Forest of Yale University at Keene, New Hampshire, a group of estate owners in the southern part of that state undertook a coöperative effort to introduce forest management on their lands in 1927. The group had two objectives in mind: first, the acquisition and control of certain key tracts in the recreational value of their community; and second, to employ a forester who might be able to occupy his full time on the properties represented by the group. The first objective was readily attained by each member subscribing to part of the total capitalization, a typical coöperative function.

The second objective was much more difficult to organize on a coöperative basis. The work of the first year, however, was underwritten by the group and was sufficient to occupy the forester's time so that at the end of the year it was possible to allocate the expenses on a *quid pro quo* basis. It became quite apparent, during that first year, that the organization could function in the financing and control of land purchases, but that it really played no functional part in the forest management sphere. The burden of developing the demand for technical work rested upon the forester, and the results of his activity might fall below or exceed the necessary minimum. As long as the association had no control over the individual members and the total work that might be executed it could not satisfactorily employ a forester and direct his activities. Therefore, after the first year the estate management phase was abandoned as a coöperative enterprise. The forester possessed all the contacts and goodwill which had been created during the trial year, and with these proceeded upon a consulting basis with the localized clientele who were more or less interested in seeing forest management continued in the community.

The estates upon which forestry work had been done during the first year fell into three groups:—first, those of small size where all operations were laid out and executed in whole by the forester and his own crew; second, larger estates where more or less skilled superintendents or gardeners with a permanent force of workers were maintained for extensive gardening, farming, or general estate work. In these cases it was usually neces-

sary to turn the execution of woods operations over to the permanent force, with varying degrees of satisfaction in the results. Third, relatively large forest estates where forestry and game management might become the dominant objective, with agriculture and other estate work of minor importance.

The first two types of estates proved to be unsatisfactory bases upon which to establish a permanent localized consulting business. The units were too small and the work required was not along the lines of productive forest management, but tended to be individual tree work. Even on the larger properties there was usually a lack of real purpose in forestry because of the competition of other interests for the attention of the owner or the estate manager. The operations dmanded usually had little to do with the life of the forest but were chiefly to mold the woods for strictly recreational values. Small operations which yielded merchantable products involved considerable liability, often more than the work was worth to the forester. Furthermore, operations scattered both in time and place did not make for satisfactory utilization of the forester's time, nor were they economical from any angle. Forestry cannot be sold piecemeal as seems to be practicable in the field of so-called tree expert work. Continuity of plan and action are essential for the cumulative result which is the objective of forest management.

Consequently, the policy of concentrating on a few of the larger properties offering the best opportunities for ultimate management of the most intensive kind has been followed. In pursuance of this policy it has become apparent that it is more feasible to offer a comprehensive type of estate management than a more limited type of purely forest land management. There are many properties in New Hampshire of considerable area, but chiefly of forest land, where the owners undertake, usually at considerable expense, the older and better known agricultural pursuits such as dairying, horse breeding, and horticulture. Where such lines of endeavor have become entrenched it is usual to find trained experts as the general managers of the entire estate. On the other hand, there are many properties which have no highly developed pursuit and where more or less unskilled caretakers are in charge. Such situations present opportunities for a forester to win for himself a position as manager, and a real forestry job if he can arouse the owner's interest in forestry and convince him that a unified management plan based upon forestry will yield both satisfaction and value. One such opportunity appeared in the group of properties mentioned at the beginning of this paper, and it is with the development of this particular forest that we are here concerned.

The property comprised roughly 1,200 acres, mostly forest lands, an eighty-acre pond and streams, with some abandoned farm land, pasturage, a few acres of cultivation, and about five acres of special use land about three residences. No extensive agricultural use of the estate had become dominant, nor was it desired to embark on any enterprise that would call for large capital outlay. Three to five full-time men had been regularly employed with a resident foreman of no particular technical skill. Eventually, the property was to pass into institutional hands, and therefore it was especially desired to put it into good physical condition without increasing, and preferably, decreasing the overhead and maintenance charge.

Past experience had taught the owner that products other than for domestic use almost invariably cost more to produce than could be realized in sales with the single exception of timber. As no expense other than the original purchase price and annual taxes had been sus-

tained, timber sales could always be made for ready cash and charged to depletion. Logging, however, had always injured the appearance of the estate and left in its wake a fire hazard which practically balanced the value of being able to liquidate timber values for general maintenance purposes. Although the owner was acquainted with European forests, and had a desire to see this property "like a German forest," it had been impractical under the circumstances to carry out that desire.

Two years of consulting supervision, however, changed the situation, and showed that the forest provided the resource that promised the greatest return with the least capital outlay, operating cost, and risk. Therefore a comprehensive estate management plan based on forestry under the direction of a full-time resident forester was adopted. The purpose of the plan was the maintenance and development of the estate as a unit, accepting the forest as of dominant importance both for its recreational and fiscal value.

The duties of the forester were to coördinate all of the separate enterprises of the farm, the summer home, and the forest. A simple and accurate system of cost accounting was set up so that the status of each sub-division would be apparent. It was necessary to know not only the financial situation of each, but the number of hours of labor necessary for each project to receive its proper proportion of attention.

Shortly after the forester started work, several things became apparent which established definitely the value of the forest management policy. In the first place, the owner was relieved of many responsibilities, worries, and much detail work. Secondly, it became clear that the continuance of the management plan would fulfill the owner's conception of what the forest estate should be. Thirdly, as a large part of the estate value was in the forest, and the work done there constituted a large proportion of the whole, the supervision was logically a forester's job, but he must serve in several other capacities as well. Fourthly, as business in general fell off, it became impossible for the owner to continue to support the estate as liberally as in the past, and it was feared that the estate must be given up or run on an outlay so much reduced that deterioration was inevitable unless the new management plan showed that it could contribute to the cost of operation of the estate. As the flexibility of the forest as a crop permitted sufficient leeway so that the immediate plans could be adjusted to the circumstances, assurance was given that despite larger operating costs, the net expense to the owner could be cut roughly in half.

There were, in general, three sources of cash income: forest products, farm products, and returns from the renting out of labor, horses, and equipment for work on other properties. In addition, it was possible to carry on certain activities which yielded no cash income but which cut down the gross expense. The major portion of the burden fell on the forest products. On account of the condition of the lumber market, and the fact that the forest capital needed building up, it was impossible to remove a large quantity of sawlogs and it was deemed inadvisable to place the emphasis on that product at the outset. The production of lumber, however, remained as the ultimate forest plan goal. With this end in view, the fuelwood market was investigated and developed. By utilizing the defective trees and weed species with low lumber value the per unit value of the remaining stand has been raised, and the annual increment of valuable species increased.

It was found that the local market could not be depended upon mainly because the supply of wood in the region was plentiful, the demand fluctuating,

and the margin of profit extremely narrow. The urban markets, therefore, became the object of scrutiny. There, it was found that in many cases the same difficulties arose as with the local market. These difficulties barred sales to wood dealers, so it was decided that the business must be retail in character, and with responsible people whose demand did not fluctuate greatly. Largely through the efforts of the owner a market has been worked up for fireplace wood, and the expansion of sales has been fairly rapid. From a small start a year ago the estate will deliver this autumn in the neighborhood of 200 cords. There is every reason to believe that the growth of the market will continue.

During the three winters from 1930-1933 a local unemployment project removed approximately 800 cords of fuelwood from the property. People living within the near-by town were permitted to cut selectively specified areas and remove the wood after burning the brush and obtaining the forester's approval for the appearance of the area. This scheme not only was a great help to local people in times of stress, but it put a large area of prominence in excellent physical condition and helped prove forest management would bring about the "German forest" idea.

Only such lumber is cut as is necessary to correct and improve stand conditions. All cuttings must be based not only on the principles of silviculture but also on aesthetics. A selection system is always used and its application is varied for each stand according to the judgment of the forester. The lumber taken out is used, to a certain extent, on the estate. In addition, a small local market has been built up to supply native species. The sawmill as yet makes no large return in cash to the forest, but it is justified on such a small unit because at present day prices it can be capitalized at little over $100.00. At this rate there is practically no overhead connected with it.

It should be emphasized here that all timber which is cut has returned a stumpage value as good or better than the average stumpage value of the region despite the fact that aestheic forestry has been practiced. The stumpage received for fuelwood has usually been higher than the value of the better hardwood species utilized as lumber, but a change in transportation costs or general market conditions may, and probably will, alter this. In addition to the above mentioned activities there are countless others, each of which plays a minor rôle but when taken in the aggregate have an important effect on the management plan. A small nursery of forest and ornamental stock is being developed. This will supply the estate with stock and leave a small remainder for outside sale.

A balance between forest and cultivated land is maintained. The chief contribution of the farm is the vegetable garden which supplies the three families dwelling on the estate as well as a number of people residing in the vicinity. A small cash income is derived from this as well as from the raising of poultry and eggs for the same clientele. Horses, a tractor, and a large truck are part of the equipment of the farm. With these the forester is prepared at all times to execute work on the estate and on adjacent or near-by properties. The labor is well balanced and some of the activities which have already been carried out are: tree and shrub moving, lawn and tennis court building, maintenance of private roads, house moving, dam building, plumbing, carpentry work of all kinds, painting, automobile repairs, fuelwood and logging jobs for outside people, surveying, boarding of horses, electric wiring, tree surgery and pruning, ice cutting, making of maple syrup, and gardening of all sorts. This by no means completes the list but

indicates the necessary versatility of the labor on such an estate.

A new project which is carried on in coöperation with the state fish and game department is the establishment of a fish and game experimental station. This is all under the personal supervision of the forester. It is not impossible that some income may be enjoyed in the future from this important phase of forestry.

Seasonally, the work can be well distributed. In the summer the chief activities are maintenance of the estate proper and agriculture. In the autumn forest work and agriculture; in the winter, forest work and the maintenance of buildings; and in the spring, forest work, maple syrup, and agriculture. Each part of the work must be fitted in nicely because there are no slack times. Stormy day work consists of sawing wood and lumber, building repair, brush burning and various agricultural activities. The past year and a half has proved in this case that a closer integration of all the operating functions and careful planning makes for much more efficient utilization. The forest has not only contributed in great measure to the maintenance of the whole, but it has itself benefited largely and will somtime yield greater returns, and eventually be on a sustained yield basis. It is not beyond reason to expect that eventually this forest estate may be practically a self-sustaining unit. To be sure, the result largely depends upon the individual executing the management, but it is also beyond question that full utilization of the forest is the essential for any success.

For the future then, the general plan is to develop the estate into as nearly a self-contained unit as is possible. The yearly cut will be approximately 500 cords. Of this, the proportions of the different products will vary depending upon the market demand, as the working plan is very flexible. The seasonal activities will be so regulated as to permit a permanent force of men. As time goes on, more work will be sought outside the single property, especially along the lines of forest operations. Any work which will help carry overhead and supervision costs will be welcome, and especially those activities which will contribute to the forest and game plans. Fuelwood, and saw timber operations which will contribute material for milling and sale will be especially sought after when conditions warrant. It is entirely possible that a number of contiguous and nearby properties will come under consulting management which will tie in a considerable forest area under a unified plan.

Conclusions

1. The management of a group of estates is not a practical coöperative function.

2. A group of medium to small-sized estates upon which some forestry supervision may be required is hardly a good back log upon which to build a permanent local forest management business.

3. The supervision of one or two relatively large forest estates where no other phase of agriculture has been intensively developed provides a sound back log of work for a forester.

4. The forester should be in a position to assume the management of all phases of work on the estate or estates, rather than merely the work of the forest.

5. Once the complete supervision of an estate is assumed and mastered, it should be possible to carry on forestry operations, and even complete management services for adjacent or nearby properties. In other words, consulting and management services of a group of properties can well be integrated around one estate if it is thoroughly organized and controlled by the forester.

SOME FACTORS INFLUENCING RESIN CONCENTRATION IN LOBLOLLY AND SLASH PINES

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The resin content of the sap-wood of second-growth loblolly and slash pine trees is not constant, but varies as the minimum temperature when below 40° F. Likewise, the moisture content is not constant, but varies inversely as the resin content. Over a period of time, the average resin content of both species was found to be approximately three per cent, and the average moisture content, forty-one per cent. Taking into consideration vertical position in the stem, the average resin content was found to increase from the base to the crown. Lack of resin flow for naval stores in cold weather is attributed primarily to a decrease in resin production and concentration within the tree, rather than to increased viscosity.

INASMUCH as there has been much interest in the use of second-growth southern pines, both by the naval stores and the pulp and paper industries, this study was made to determine the resin content of each of the two groups of southern pines, namely, those adapted and those not adapted to the production of naval stores. For this purpose slash pine (*Pinus caribaea* Morelet) was selected to represent the former and loblolly pine (*Pinus taeda* L.) the latter group. The slash pine trees used were selected in Treutlen County, near Soperton, Georgia, and the loblolly pines in Clarke County on the demonstration forest of the Georgia Forest School. Samples were taken from the same trees throughout the period of the investigation which extended from October, 1931, to August, 1932.

In making this study, the method used has deviated somewhat from the usual procedure in that the amount of resin held within the tree was determined rather than that which flows out when the tree is wounded. This method of attack was chosen because it seems logical that the point of origin of the resin is of primary importance in an investigation of this type. Several investigators (1, 3) have shown that the resin from the two sources are one and the same, hence factors influencing one should influence the other. The discussion in the following paragraphs will serve to justify this contention.

The general arrangement and function of resin ducts within the stem of pines is of common knowledge to the student of wood technology; however, until recent years little progress has been made in determining the more detailed mechanism and function of these ducts or canals. More recent works (1, 3) have brought to light many facts and theories, some of which are of interest in connection with the work discussed in this paper.

Summing up the work of these authors, we find that in general their observations lead them to describe the resin duct as an intercellular space or canal, surrounded by thin-walled epithelial cells which constitute its limiting sheath or wall. Immediately surrounding this sheath is a thin layer of dead cells, separated in part from an outer layer of parenchyma by small intercellular spaces or air pockets, and beyond the parenchyma are found the tracheids.

There has long been a question as to whether the resin is formed within the needles and then passed through the duct system of the tree; is formed in the duct itself; or is formed in the parenchyme or food cells. Recent investigators (3), however, have observed tiny droplets of resin

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within the epithelial cells comprising the sheath of the duct, and for this reason they contend that it is formed within these cells.

Münch (1) states that when a resin duct is opened, the compressed epithelial cells imbibe water from the surrounding wood and swell until their walls have largely filled the resin canal, hence forcing the resin out through the end of the duct. When the wound has healed over and no more resin can flow, the duct gradually fills up through the formation of new resin by the epithelium, and the cells of the latter gradually assume their original flattened form.

To state that the resin passes from epithelium into the resin ducts is a simple matter, but the manner of passing has not yet been determined, for the walls of the epithelium contain no pits and any resin passing through must penetrate the wall and the water contained therein. Hannig (1, 3) has advanced the theory that an emulsifying action is involved and that the resin appears in the form of tiny droplets in a secretion field on the surface of the protoplasm from small rupturing vacuoles, only then passing out through the cell wall into the resin canal. Münch (1) states that the mode of passing is not thereby explained since the droplets must again dissolve or emulsify in order to be able to pass through the water-saturated membrane. Regardless of the process involved or the origin of the material, there is little doubt that the resin is formed within the cells adjacent to the ducts, or other cells closely related to them, and passes out through the walls of these cells into the duct and hence through any opening in that canal caused by wounding. Thus we can see that this resin contained within these ducts, and which is that which we extracted from the wood with solvents, is the same as that which is obtained by naval stores or turpentining methods. Any factor influencing one must influence the other.

Procedure

Field.—In view of the reported influence of vertical position upon resin concentration, it was decided to take samples from the base, the crown, and midway between. At the base the samples were taken at a height of two feet above the ground; in the crown they were taken as near the vertical center as possible; and midway they were taken equi-distant from the other two points. Samples were secured by boring into the tree with a brace and three-quarter inch bit to a constant depth. Borings were allowed to fall into a half pint fruit jar which was fitted with a rubber ring and a clamp top. Every precaution was made to keep out bark and other foreign material, and to prevent loss of moisture between

Table 1

AVERAGE RESIN CONTENT OF LOBLOLLY AND SLASH PINES BY MONTHS[1]

Month	Loblolly pine		Slash pine	
	Resin content (per cent)	Number of observations	Resin content (per cent)	Number of observations
October	3.35	2		
November	2.92	12		
December	2.82	12		
January				
February	3.63	9	3.17	20
March	1.84	10	2.75	20
April	3.22	11	3.20	23
May	3.00	4		
June	3.60	4	3.01	9
July	3.62	4		

[1] All resin percentages are figured on a dry wood basis.

sampling and analyzing. Consecutive borings at each position were taken at a point on the periphery as far from the previous borings as possible, in order to avoid coming into contact with any "activated" wood from a previous boring.

Laboratory.—Twenty-five gram samples were used for analysis, and, after being carefully weighed, were placed in a 500 cc. Erlenmeyer flask fitted with a Dean & Starke moisture tube and a condenser. Benzene was chosen as the most efficient solvent. Its low boiling point and the fact that it is immiscible with water were points in its favor. The chips were completely covered with the solvent and allowed to reflux until all of the moisture had passed over into the moisture tube or trap. This required about four hours, and in order to be sure that all of the resin was dissolved, the solvent was poured off, more added and allowed to reflux for another four hour period. Following filtering, most of the solvent was distilled off and recovered. Upon reaching a high concentration, the benzene-rosin solution was poured into a tarred beaker and evaporated to dryness, i. e., until all of the solvent was removed. The per cent rosin (since the turpentine was distilled off with the solvent) was then calculated on a dry wood basis. As the amount of turpentine lost in the samples used was almost negligible, the rosin per cent and the resin per cent were assumed to be proportional in presenting our results.

Seasonal Concentration As Affected By Temperature

While it was thought there might be some variation in the resin content, it was not anticipated that the fluctuations would be

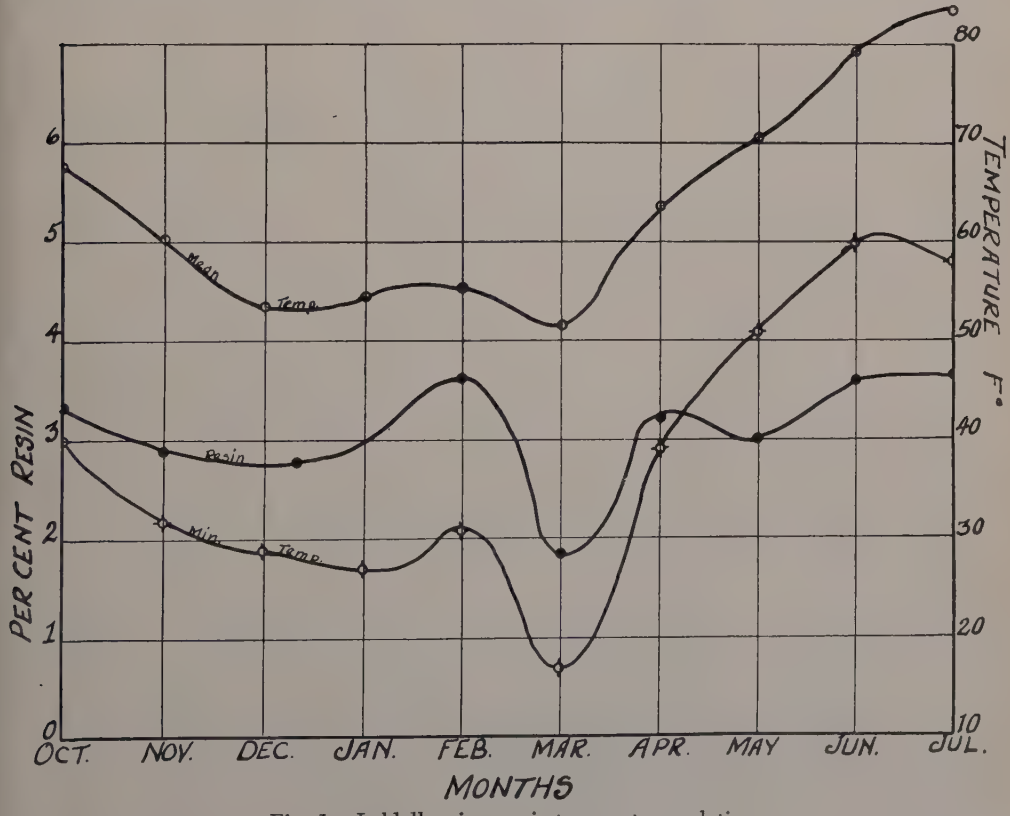

Fig. 1.—Loblolly pine, resin-temperature relation.

as great as was found. In slash pine it was found that individual trees varied, during the period of observation, as much as 1.8 per cent, with an average variation of 0.45 per cent for all samples. Loblolly pine was even more erratic and varied as much as 2.8 per cent for individual trees and an average of 1.78 per cent for all samples. The average monthly resin content for all samples varied from month to month, as is shown in Table 1.

After sufficient samples had been analyzed to find that there was a very definite variation in the concentration of resin within the tree, the cause was sought. Knowing that temperature has a marked effect upon the flow of resin in the production of naval stores (4), it was thought that temperature probably had a like effect upon the concentration of resin within the tree. In order to determine this, the average per cent resin content of loblolly pine by months (Table 1) was plotted together with the mean monthly temperatures at Athens, as is shown in Figure 1. As this did not definitely explain the sudden drop in resin content in March, it was decided that there must be some other factor which had a closer correlation. As the coldest weather of the winter occurred during this month, it was thought that the minimum temperature might have something to do with this drop, and, upon plotting, a close correlation was found when the minimum did not exceed 40 degrees Fahrenheit. (See Figure 1.) Present data, however, do not justify a definite statement or theory as to why this relationship exists.

As climatological data were not available for Soperton or Treutlen County, the observations at Dublin, Laurens County, which is nearby, were used (Table 2). These data, together with the resin per cent by months for slash pine (Table 1), were plotted and showed a similar relationship. (See Figure 2.)

These observations correspond to the findings of the naval stores operators in the spring of the year when, after the gum has begun to flow, there is a sudden cold spell and as a result the gum stops flowing almost immediately. This stopping of the flow has been attributed to an increase in the viscosity of the gum during the cold period (3). From our observations it appears that this may have some influence; however, it is probably affected to an equal or even greater extent by the lack of production of oleoresins within the tree.

If the results throughout the year are studied, it will be found that for the 68 samples of loblolly pine, taken over a period of ten months, the average resin content for the period was 2.98 per cent. For slash pine, over a period of five months and with 72 samples, the average resin content was 3.03 per cent. In other words the resin content of loblolly pine, a tree not adapted to naval stores production, and slash pine, a tree used for naval stores production, is the same when taken over a period of time and averages approximately three per cent. This fact is of even more significance when it is understood that the loblolly pine was growing in the Piedmont section of the state and slash pine was in the Coastal Plains section. If there was any difference in the average content, it should have been accentuated by this difference in location.

TABLE 2

AIR TEMPERATURES OF ATHENS AND DUBLIN, GA.[1]
(Degrees Fahrenheit)

Month	Athens		Dublin	
	Mean	Minimum	Mean	Minimum
October	67.4	40	68.4	37
November	60.6	32	60.8	26
December	53.6	29	57.8	30
January	54.4	27	57.1	30
February	55.2	31	59.2	27
March	51.7	17	54.8	20
April	63.6	39	65.7	40
May	70.5	51	72.1	49
June	79.4	60	79.4	59
July	83.4	58	83.6	65

[1] Data furnished by U. S. Weather Bureau, Atlanta, Georgia.

Whether this same figure, 3 per cent, will be found to hold true for the other southern pines, longleaf (*Pinus palustris* Miller) and shortleaf (*Pinus echinata* Miller), is not known; however, preliminary investigations indicate that this is probably true. From the few observatons made, longleaf pine seemed to contain a little more, and shortleaf pine a little less than three per cent. A definite statement cannot be made, however, until more complete data are available for these two species.

Resin Concentration as Affected by Vertical Position in the Stem

In determining the seasonal concentration of resin as affected by temperature, samples were take from three positions in the tree, as already stated. This was done in order to determine whether position had any effect upon resin content, and if it did, to eliminate any error that might occur due to position.

In analyzing the results of these three positions, the monthly averages showed

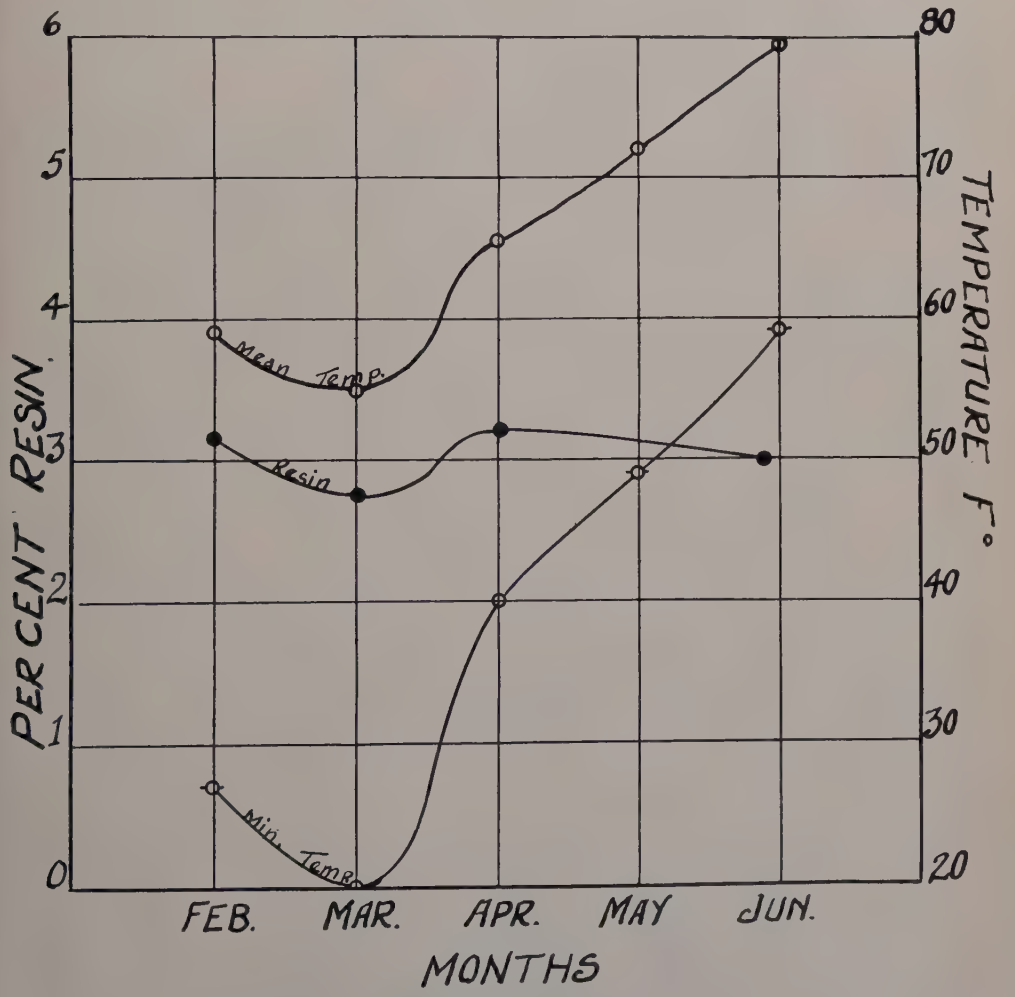

Fig. 2.—Slash pine, resin-temperature relation.

TABLE 3

AVERAGE RESIN CONTENT OF LOBLOLLY AND SLASH PINES BY MONTHS AS AFFECTED BY POSITION IN TREE

Month	Loblolly pine			Slash pine		
	Resin content (per cent)					
	Base	Middle	Crown	Base	Middle	Crown
November	2.6	2.9	3.25			
December	2.8	2.8	2.9			
January						
February	3.9	3.3	3.7	3.14	3.17	3.25
March	2.0	1.65	1.8	2.46	2.76	3.22
April	3.0	3.3	3.4	2.89	3.24	3.49

that in practically all cases the resin content increased from the base to the crown. The notable exceptions are the averages for loblolly pine in February and March, when the base had the greatest constant, the crown the next greatest, and the middle the least. Just why this change occurred in these two months has not been satisfactorily determined, and it is hoped that further investigation may clear up this point.

In studying the results for loblolly pine over the five month period obtained from 16 observations in each of the three positions (total 48), and for slash pine over the three month period obtained from 18 observations in each of the three positions (total 54), the averages of all of these observations showed that for each species the resin content increased from the base to the crown. (See Table 4.)

TABLE 4

AVERAGE RESIN CONTENT OF LOBLOLLY AND SLASH PINES FOR ALL MONTHS AS AFFECTED BY POSITION IN TREE (IN PER CENT)

Species	Base	Middle	Crown
Loblolly	2.92	3.06	3.09
Slash	2.93	3.16	3.44

WOOD MOISTURE AND RESIN CONCENTRATION

In determining the resin per cent on a dry wood basis, it was necessary to de-

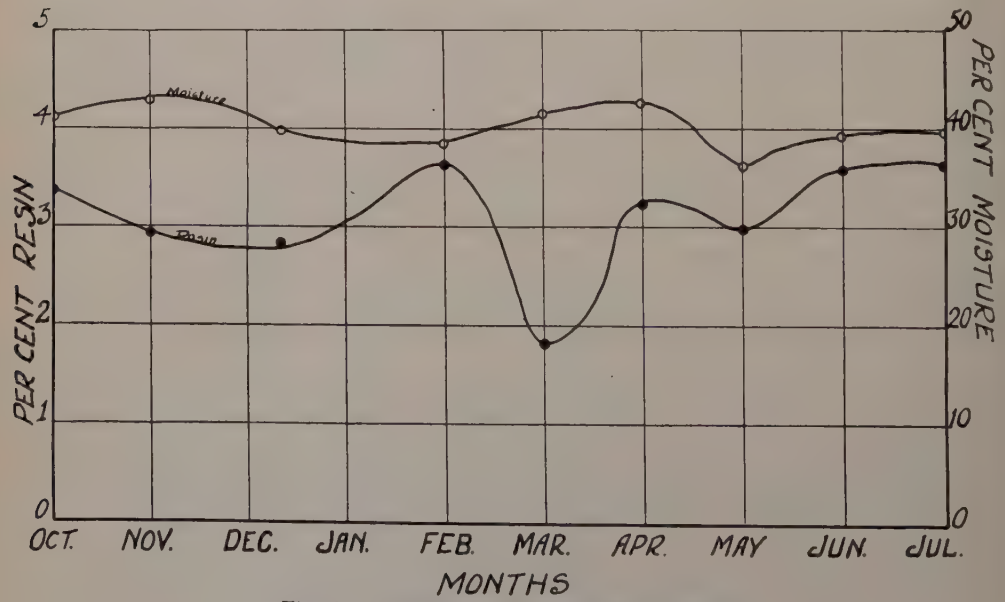

Fig. 3.—Loblolly pine, resin-moisture relation.

termine the amount and per cent of moisture in each sample on a fresh wood basis. These percentages, when averaged by months, gave the results contained in Table 5. In calculating the average moisture per cent for the entire year, it was found that 69 samples of loblolly pine, taken over a period of ten months, gave a moisture content of 40.7 per cent, while slash pine with 76 samples taken over a period of five months gave an average moisture content of 41.5 per cent. From this it can be seen that the average moisture content of these two trees is practically the same and averages roughly 41 per cent based on the total weight of wood and moisture.

In studying moisture content in relation to the resin concentration, it was found that when there was a decrease in the resin content, there was a correlative increase in the moisture content and vice versa. While this relationship does not hold true for every month with loblolly pine, as is shown in Figure 3, the results for slash pine indicated this in each case. It is therefore believed that there is a relationship between the two, although present figures do not prove it conclusively.

Conclusions

(1) The resin content of the sapwood of second growth loblolly and slash pines is not constant, but varies according to the variations in temperature and particularly variations in the minimum temperature below 40° Fahrenheit.

(2) If these two species are to be used for the production of paper—particularly newsprint or book paper—there will be less resin to contend with, if the trees are cut during or immediately following a sudden, sharp drop in temperature during the winter.

(3) That while the flow of resin in the production of naval stores during periods of cold weather is affected by an increase in the viscosity of the gum, it is affected to an equal or even greater extent by a decrease in the production of resin within the tree.

(4) Taken over a period of time, the resin content of the sapwood of second growth loblolly and slash pines is the same, and averages ± 3 per cent, dry wood basis, or ±1.8 per cent, fresh wood basis.

(5) The average resin content of the sapwood of second growth loblolly and slash pines is least in the base, and in-

Table 5

AVERAGE MOISTURE CONTENT OF WOOD OF LOBLOLLY AND SLASH PINES BY MONTHS

Month	Loblolly pine		Slash pine	
	Moisture content (per cent)[1]	Number of observations	Moisture content (per cent)[1]	Number of observations
October	41.0	2		
November	42.9	12		
December	39.9	12		
January				
February	38.7	9	41.8	23
March	41.2	12	43.0	24
April	42.8	10	41.1	23
May	36.2	4		
June	39.2	4		
July	39.5	4		

[1] Based on total weight of wood and moisture.

creases in going up the tree into the crown.

(6) Preliminary investigations seem to show that a decrease in resin content is correlated with an increase in moisture content, and vice versa.

(7) The moisture content of the sapwood of second growth loblolly and slash pines, taken over a period of time, is the same and averages 41 per cent based on the total weight of wood and moisture.

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MICROCHEMICAL STUDIES OF TYLOSES[1]

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Tyloses are protrusions found in the vessels of certain hardwoods. Their chemical nature is of interest in appraising their effect upon durability and other properties. From the investigation here reported it appears that, in the woods studied, tyloses present three distinct variations as to the thickness of their walls.

THE extent to which tyloses (Figs. 1 and 2) affect the durability and penetrability of wood makes it desirable to know something of the chemistry of these "pore" intrusions. The durability of such woods as osage orange, *Toxylon pomiferum* Raf.; black locust, *Robinia pseudoacacia* L.; and white oak, *Quercus alba* L., and the difficulty of impregnating these timbers with preservatives illustrate this point. Hence, it was thought that a microchemical study of tyloses might bring to light information of value in the utilization of woods featured by these structures. Moreover, the microchemistry of these growths is of importance as contributing to a better understanding of those larger subjects, the nature of the plant cell wall and the chemistry of wood in general, fields of research which have been the subject of investigation by Ritter (12), Harlow (6), and others. With this in mind, the tyloses of a number of hardwood species were studied.

Tyloses

Tyloses are bladder-like protrusions which are found partially or wholly occluding vessels, more rarely in tracheids and fibers; they are in reality the greatly enlarged membranes of pits leading from these elements into adjacent parenchyma and may originate through differences in pressure in these contiguous elements. A tylosis is not, as a rule, an individual cellular unit although sometimes, according to Molisch (10), it is divided from the parent cell by a wall and may then contain a separate nucleus. Although tyloses in most woods are thin-walled, thick-walled tyloses are not infrequent and on occasion they may become strongly sclerosed. In the latter instance, as will be shown, the wall consists of three layers, viz. (1) the *outer* or *primary* which borders directly on the lumen of the vessel or other enclosing element, (2) the *middle* or *secondary* layer interior to the primary, and (3) the *inner* or *tertiary* layer which lines the interior of the tylosis.

Historical

Various workers have investigated the development and function of tyloses[2] but to date no specific studies have been made of their chemical nature. In 1884, de Bary (2) mentioned the "cellulose" walls of tyloses but this was in line with current botanical concepts regarding the plant cell wall and perhaps for this reason no chemical evidence was presented to support his statement. The contents of tyloses have been noted and a number of writers have reported such inclusions as starch, gums, tannins, and even crystals.

[1]This study was conducted by the author in the Dept. of Wood Technology, N. Y. State College of Forestry, Syracuse, N. Y. The author desires to express his appreciation to Dr. W. M. Harlow especially, and also to Dr. H. P. Brown and Prof. F. C. Peterson for helpful suggestions and advice.

[2]See Gerry (4) for a summary and bibliography of the early work.

Definition of Terms

Since some confusion exists in the nomenclature of such substances as "pectin," "lignin," and "cellulose" it will be necessary to define these terms as used in this paper.

Pectin.—Pectins (the gel-forming constituents of fruits) are complex carbohydrates of high molecular weight. Pectic substances are generally divided further into protopectin, pectin, and pectic acid. Certain authors believe pectin to be based on a complex unit formed by the union of galacturonic acid, galactose, arabinose, methanol, and acetic acid (5). In practice, the pectins in plants are removed by dilute inorganic acids or weak solutions of ammonium oxalate, citrate or tartrate (3).

Lignin.—Lignin is a complex substance (or group of substances) removable from wood by repeated chlorination followed by hot sodium sulfite solution[3] but insoluble in cold, concentrated acids (e. g. 70 per cent sulfuric). In quantitative work, to avoid the presence of extraneous substances in the lignin residue, the material is previously extracted with organic solvents. The chemistry of lignin is exceedingly involved and has been studied by many workers among whom there is little unanimity of opinion. These investigations indicate that lignin may have an aromatic nucleus to which are attached various methoxyl, hydroxyl, formyl, and acetyl groups.

Cellulose.—Cellulose is the principal polysaccharide of the cell wall; it is readily soluble in cold, 70 per cent sulfuric acid[4] but is insoluble upon chlorination and subsequent treatment with hot sodium sulfite solution.

The above definitions may be accepted provisionally since the methods indicated are used by numerous investigators in the quantitative analysis of wood.

Materials and Preliminary Technique

For this study, transverse sections of the heartwood (40μ thick) of several relatively soft woods were used. The blocks from which these were prepared were not softened with hydrofluoric acid since Harlow (7) has found that wood so treated may undergo a partial chemical change. The sections were extracted with a mixture of alcohol-benzol (1-1) for four hours on a steam bath and were then washed thoroughly with 95 per cent alcohol, and stored in 50 per cent alcohol until needed.

Species with fairly numerous tyloses were chosen since the action of the sulfuric acid is so rapid that a tylosis must be located quickly in the field of the microscope to permit of proper comparison before and after treatment. With this in mind, the following species were selected for investigation: catalpa, *Catalpa speciosa* Ward.; butternut, *Juglans cinerea* L.; white oak, *Quercus alba* L.; sassafras, *Sassafras variifolium* (Salisbury) Kuntze; black ash, *Fraxinus nigra* Marsh.; Oregon ash, *Fraxinus oregona* Nutt.; pumpkin ash, *Fraxinus profunda* Bush.; chestnut, *Castanea dentata* (Marsh.) Borkh.; Engelmann oak, *Quercus engelmannii* Greene; *Sterculia urens* Roxb.; *Quercus dilatata* Lindley; and

[3]Lignin may also be removed by repeated treatments with saturated bromine water followed by 10 per cent ammonium hydroxide (11). Because of ease in handling, this method was used in the present instance.

[4]Other investigators on the chemistry of the cell walls of wood have used 72 per cent sulfuric acid but Sherrard and Harris (14) have found that 70 per cent sulfuric acid at 10° C. causes less carbonization and is therefore a better hydrolyzing reagent. More recently Ritter and his coworkers (13) have modified the quantative determination of lignin by the 72 per cent sulfuric acid method although still using the same concentration.

Boehmeria rugulosa Wedd. (the last three woods were from British India).

Methods of Microchemical Analysis

Removal of pectin.—1. Sections were extracted with 0.5 per cent ammonium oxalate solution on a steam bath for 24 hours (not continuously) and were then examined with a microscope for evidences of disintegration. The extraction was continued for an additional 48 hours and the section again viewed at the same magnification.

2. Similarly, sections were hydrolyzed with 2.5 per cent sulfuric acid on a steam bath for four hours at room temperature.

3. Sections were treated alternately with 3 per cent hydrochloric acid and 3 per cent sodium hydroxide on a water bath (52°-54° C.) for half-hour periods (three treatments with each reagent).

Removal of lignin.—1. A section of wood was placed on a micro-culture slide and treated alternately with saturated bromine water (approx. 15 min.) and with 10 per cent ammonium hydroxide (approx. 5 min.). This process was repeated until the structural elements of the wood separated from each other. The residue was then treated with 70 per cent sulfuric acid at room temperature to determine if delignification was complete.

2. Sections of certain species were treated with 10 per cent sodium hydroxide solution at steam bath temperature for 90 minutes.

3. Material of some of the woods originally selected was macerated by Schultz' method[5] and the isolated vessel segments thus obtained were examined for tyloses with the microscope. Maceration was also effected by alternate treatments with saturated bromine water and 10 per cent ammonium hydroxide.

Removal of cellulose.—A section of wood was placed on a micro-object slide and was then treated with 70 per cent sulfuric acid. A tylosis previously selected was watched closely with the microscope until no further visible change was evident (approxi. 10 min.). As a check, sections were treated with a large excess of 70 per cent sulfuric acid in a Syracuse watch glass for at least 24 hours.

Polarized light.—Since it is known that cellulose transmits polarized light and isolated lignin does not, sections of each wood were examined between crossed nicols to determine whether the tyloses were positive or negative in this respect.

Experimental Results

Solubility tests for pectin.—Pectin solvents gave negative results on sections of catalpa, butternut, white oak, sassafras, and black ash, i. e., the walls of the tyloses showed no signs of disintegration. The remaining species were not tested.

Removal of lignin.—1. Tyloses in the ash species were distinctive since they dissolved completely in the lignin solvents. In the other woods examined, the outer or primary tylosic layer dissolved leaving the inner (secondary) layer (Fig. 3); the latter was completely soluble in sulfuric acid.

2. The tyloses of catalpa, butternut, white oak, sassafras, black ash and chestnut were not visibly affected by 10 per cent sodium hydroxide solution.[6]

3. After maceration by Schultz' method, tyloses could not be found in the vessel segments of black ash and catapla[7] but were still present in the segments of butternut and white oak. In material macerated by the bromine water method, no tyloses were found in the vessel segments of black and pumpkin ash but ty-

[5]Nitric acid and potassium chlorate.

[6]This method probably failed to remove the lignin completely because of the concentration of the alkali and because high pressures could not be conveniently used.

[7]In catalpa, due to oxidation, the tyloses were probably dissolved since they were not removed by the less drastic bromine water method.

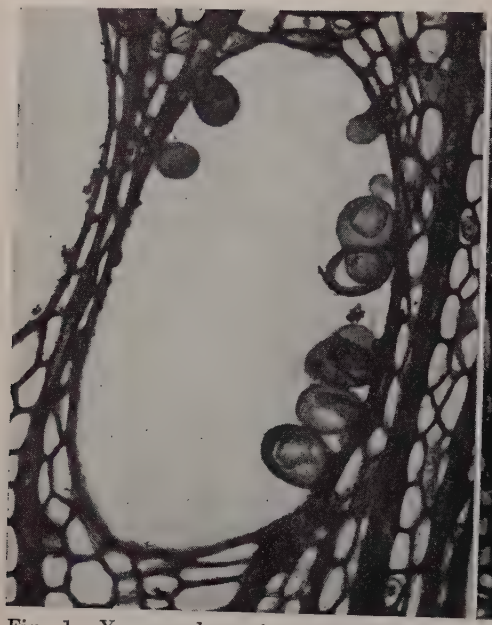

Fig. 1.—Young tyloses in chestnut. 200X (Courtesy of Mr. E. S. Harrar).

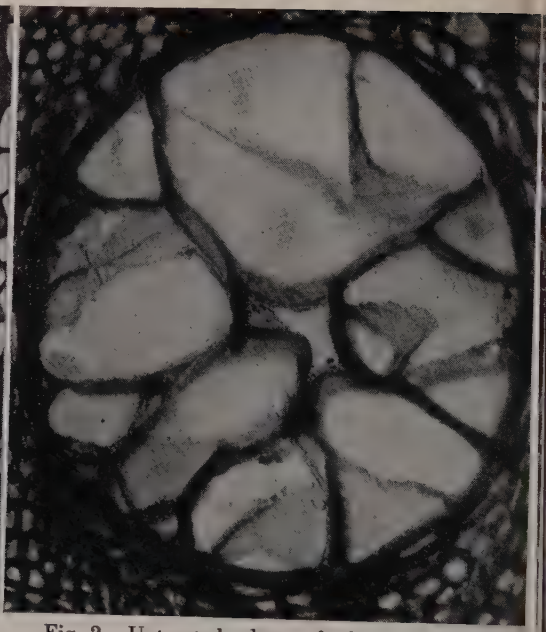

Fig. 2.—Untreated tyloses of white oak. 170X.

Fig. 3.—Tyloses of catalpa after removal of lignin. 170X.

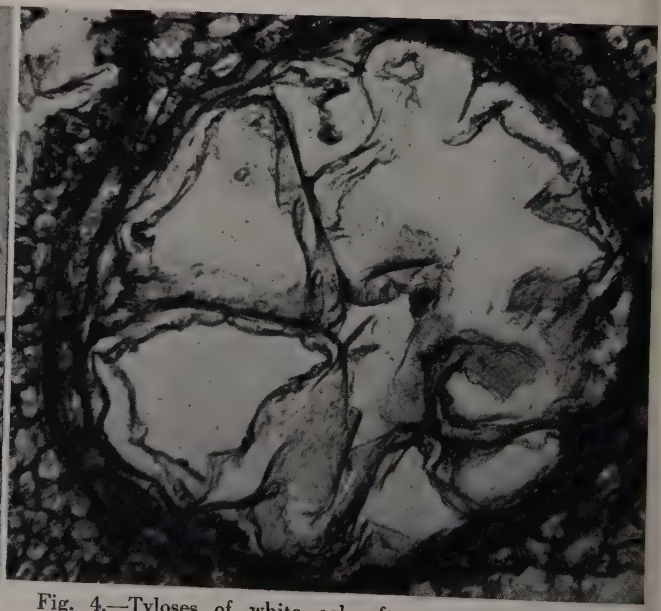

Fig. 4.—Tyloses of white oak after treatment with 70 per cent sulfuric acid. 170X.

loses were still visible in catalpa and sassafras. Oregon ash was not treated in either instance.

Removal of cellulose (70 per cent sulfuric acid).—The tyloses of the oaks showed a laminated wall consisting of three layers; of which the outer and inner layers were unaffected by the treatment while the central layer dissolved (Fig. 4). In the other woods investigated, the tyloses were apparently unaffected by the acid although a thin cellulosic layer may have been present, as is explained below.

Polarized light.—In general, tyloses in the different woods transmitted polarized light strongly, the ash species excepted, where transmission was faint or occasionally entirely lacking. In the oaks, the central or secondary layer of the tylosis wall transmitted polarized light readily but the two remaining layers did not possess this property to any extent.

Discussion

Certain botanists have considered the middle lamella to be pectic in nature (1). Since a tylosis originates from the cyst-like enlargement of the membrane of a pit (middle lamella) between a parenchymatous cell and a non-living element, it seemed desirable to test the wall of the tylosis for pectin. In all the woods examined, the pectin solvents did not appear to affect the tylosis. It was therefore concluded that pectin was probably not present in the wall in appreciable amounts, since such treatments readily cause maceration of parenchymatous tissues when a quantitative determination is made for pectin.[8]

Chemically, tyloses seem to consist of three types, (1) those with very thin walls composed chiefly of lignin to which are added perhaps small, irregular patches of cellulose; (2) those with a thin, secondary cellulosic layer interior to the outer layer of lignin; and (3) those of the oak type which have a somewhat thicker secondary layer of cellulose to which is also added a tertiary layer of lignin, the latter, however, not distinguishable in untreated sections.

Tyloses of the first type were found in the ash species studied. An objection might be raised that only the point of attachment was affected and that the tylosis was washed away by subsequent treatment. Careful observations after each treatment showed that this was not the case. Since polarized light was transmitted faintly or unevenly, there may be patches of cellulose attached to the lignin layer which are actually lost by washing. However, it seems reasonable to consider this tylosis wall as composed almost entirely of lignin.

Catalpa, butternut, sassafras, chestnut, *Sterculia,* and *Boehmeria* possessed tyloses of the second type. In these species, the tylosis wall was apparently unaffected by the acid treatment. Since a layer of cellulose was left after treatment with the lignin solvents, the inability to observe a difference in the thickness of the wall before and after acid treatment was probably due to the nature of the material used (temporary unstained mounts) which rendered examination at high magnification difficult. It may be argued that the cellulose and lignin are intermixed physically, chemically, or both, in a single layer but this seems unlikely since after delignification the tyloses can be separated easily with dissecting needles.[9] If the first type dis-

[8]It is of interest to note that observations made on the middle lamella of the treated sections further supported Ritter's (loc. cit.) claim that the middle lamella of wood is not pectin. Quantitative analyses of wood have shown only very small amounts of pectin (9).

[9]This interpretation should perhaps be scrutinized, in view of Harlow's recent findings on the chemistry of the cell walls of wood (8).

cussed is considered as the simplest in structure, then this tylosis consists of a similar wall plus an inner cellulose layer.

The third type of tylosis is found in the oak species examined (Fig. 2). Here, the lignin solvent removed the substance between contiguous tyloses, indicating that the outer layer is principally lignin. Treatment with sulfuric acid dissolved the secondary wall and left the outer layer of lignin as well as a hitherto unseen tertiary layer of the same chemical nature (Fig. 4). This might have been predicted since in examining untreated sections between crossed nicols the central layer transmitted polarized light while the outer and inner layers did not.

Summary

The chemical nature of tyloses has been studied in several woods. In the species examined, variations were found depending on the thickness of the wall of the tylosis; in general, three types were found. The simplest had very thin walls composed chiefly of lignin to which were addel perhaps small, irregular patches of cellulose. Similarly, the second type consisted of a outer layer of lignin within which was a thin lining composed for the most part of cellulose. The third type included those tyloses with medium or heavily sclerosed walls which had, in addition to the two previously mentioned layers, a third interior layer of lignin. In contrast to the second type, the central or secondary layer was somewhat thicker.

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Fire Tests with Cigarettes

The results with the untipped cigarettes of the kind that continues to burn after being lighted, indicate that fires may be caused by them when discarded on combustible materials. Placed on grass and forest floor materials, a draft was found necessary to produce flaming ignition. As determined at the level of the exposed material placed with its surface in an inclined position, and with the air current impinging thereon at an angle of 45 degrees, the range in air velocity most favorable for ignition was from 3 to 4 miles per hour. With the surface of the materials in a horizontal position and the speed of horizontal air currents measured a few inches above the materials, the range for which the highest percentage of ignitions obtained with most of the materials was from 6 to 7½ miles per hour. The air speed at the surface of the exposed materials would be expected to be considerably lower.

Under the conditions of the test, with the most favorable drafts and with relative humidities in the range 25 to 50 per cent, fires were caused on the average by nine out of ten lighted half-length, untipped, fast-burning cigarettes discarded on grass, forest litter, or duff. The percentage of cases resulting in fires increased somewhat with decrease in relative humidity.

The fire hazard of the slow-burning type of cigarette, in which the glow will not progress appreciably after it is discarded, was found to be much lower than for those of the type that, under similar conditions, continue to glow until fully consumed.

The fire hazard of discarded lighted cigarettes can be decreased by applying tips of cigarette paper. In tests with half-length fast-burning cigarettes having tips one inch long of paper similar to that used on this type of cigarette, four fires occurred on the average of every ten trials. With tips of the same length made of the paper used on slow-burning cigarettes, the occurrence of fire in the exposed materials was reduced to one out of four trials.

The placing of tips on cigarettes is practical from the manufacturing standpoint and if made of cigarette paper, they apparently introduce little cause for objection on the part of the user.—*Fire Hazard Tests with Cigarettes*, National Fire Protection Association.

IS SUPPRESSION A POSSIBLE CAUSE OF BIRD'S-EYE IN SUGAR MAPLE?

By L. A. HOLMBERG

Junior Forester, Lake States Forest Experiment Station, St. Paul, Minn.

After a statistical analysis of the rate of growth and the presence of bird's-eye figure in maple, the author comes to the conclusion that bird's-eye figure is more prevalent in suppressed trees of virgin-growth stands which have grown slowly during the first century of their life, and that consequently much longer time would be required to grow trees containing bird's-eye figure than trees with plain wood.

AFTER casual observation by woodsmen and some scientific investigation the cause of the formation of the bird's-eye figure in maple is still unknown. An old bird's-eye log buyer said that he cannot tell just what sort of trees, nor what part of the stand will have the figure, although he ventured the opinion that it is found quite often, but not always in "scrubby" trees. He also stated that he finds bird's-eye trees quite often in groups of varying size.

In his superficial observations on the occurrence of bird's-eye, C. G. Bates of the Lake States Forest Experiment Station observed that it was quite characteristic of the bird's-eye logs to have dark or rotten hearts. This led him to suspect that suppression might play a large part as a cause of bird's-eye. As a result of this suspicion, 44 logs were examined in the yards of the Escanaba Veneer Company at Escanaba, Michigan.

Decade-growth measurements were made at the lower end of 26 butt logs showing bird's-eye figure, and of 18 unfigured logs. The extent of the figure at the top and bottom of each log was noted, as well as the approximate age at which the radial streaks were first visible to the unaided eye. Because the unfigured logs in the mill yard were as carefully selected as the figured logs, an additional check of 37 trees was obtained from available stem analysis data, in order to bring out the relationship of the growth rate of figured trees to that of the average tree in a virgin stand.

To make the analysis of more individual application, and to give character to the general averages, the logs were subdivided into several small groups according to growth tendencies and the extent of the figure. When the growth averages for these groups were plotted cumulatively, it was found that the curves of growth were very similar in tendency, and fell naturally into their places according to the clearness and extent of the bird's-eye figure. The more slowly growing groups had the heavier figure, and the intermediate group was of slightly figured logs in which the bird's-eye figure did not extend to the periphery.

In order to determine the reliability of the general averages, the probable errors were computed, as samples, for the second and tenth decades, average periodic radius growth. The results are given in Table 1.

Such significance of almost one-third and one-half shows that we are dealing with remarkably uniform data and justifies our speculation concerning the facts which might be definitely proven by a more detailed and extensive study.

As it is difficult to say what growth rate should be regarded as an indication of suppression, the following method was used: Incomplete decade growth measurements were available for 79 trees which were grown under virgin conditions be-

sides the 37 complete stump measurements used in the check group. The dispersion of the 581 decades as to growth rate showed that the average growth rate in a virgin stand at all ages is about 12 millimeters of radius growth per decade, (stump height), 52 per cent of the decades falling below that rate of growth. This is somewhat more conservative than the figure which Zon and Scholz[1] give for the average diameter growth in the same stand, (the equivalent of 13 millimeters at breast height). Five millimeters of radius growth per decade was arbitrarily set as a measure of suppression, only 7 per cent of the growth taking place at that rate or below.

One hundred years seems to be the critical age for suppression in its possible effect in the formation of the bird's-eye figure, the periodic growth rates becoming approximately the same by the end of the second century of growth. This is due to a decline in growth rate of the plain trees shortly after the first century of growth is past, while the figured trees continue to increase their rate of growth.

To show the relationship existing between the growth rates in the three groups for the first and second centuries, Table 2 has been prepared.

While individual trees, of course, are to be expected to vary in their response to the same stimuli, we may conclude from the above table that the great majority of trees which are severely suppressed during the first century of their growth will develop the bird's-eye figure to a commercial extent. As most of the logs with light figure had average growth rates of over 13 millimeters during the second century, we may add as a condition to retaining the figure, that the average growth should not exceed 13 millimeters per decade during the second century. It is, therefore, evident that bird's-eye logs are to be looked for in the more dense portions of even virgin stands.

From the cumulative growth curves, I estimate that it will require sixty years longer to grow a bird's-eye tree of 18 inches in diameter than it will to grow the average normal 18-inch tree in a virgin stand.

Summary

1. Observations and decade-growth measurements were made on 26 butt logs of sugar maple which had more or less of bird's-eye figure. These observations and measurements were compared with those of 18 carefully selected unfigured veneer logs and 37 trees grown under virgin conditions.

2. In spite of the small amount of data, its uniformity permits us to assume that our results are reliable.

3. Suppression was found to be a dis-

Table 1

PERIODIC INCREMENT AND PROBABLE ERROR OF PLAIN AND FIGURED LOGS

Decade	Plain		Figured		Significance
	Average	P. E.	Average	P. E.	
	Millimeters	Millimeters	Millimeters	Millimeters	Millimeters
2	5.9	0.602	3.9	0.332	1.1
10	14.2	0.648	8.6	0.643	4.3

[1]Zon, R. and Scholz, H. F. How fast do northern hardwoods grow? Univ. of Wis. Agr. Exp. Sta., Research Bul. 88, Jan., 1929.

tinct characteristic of the bird's-eye figured logs examined, sixty years more being required to grow a bird's-eye tree 18 inches in diameter, than the average tree of the same diameter in a virgin stand.

TABLE 2

GROWTH RATES IN THE FIRST AND SECOND CENTURIES OF GROWTH

Group	Number of trees	Average growth per decade Millimeters		Dispersion of decade growth rates 0 to 100 years		
		Below 100 years	100 to 200 years	Below 5 millimeters	5 to 11 millimeters	Above 12 millimeters
				Per cent	Per cent	Per cent
Check	37	12.4	15.5	28.1	46.1	25.8
Plain	18	9.5	14.7	26.7	31.1	42.2
Bird's-eye	26	5.5	12.8	59.7	34.2	6.1

St. Lawrence University's Demonstration Forest

In October 1932, St. Lawrence University at Canton, N. Y. purchased an abandoned farm of 204 acres for a demonstration forest. The tract is at Sandy Creek, on route 11, midway between Syracuse and Watertown. The farm was typical of the abandoned lands of this section of the state. The house and some of the outer buildings burned in 1916 and the land has not been tilled or pastured since 1923. About a third of the area, which is likewise typical of such lands, is wooded and the remainder open.

The university has planted trees in the open spaces as a demonstration of a type of treatment for such lands. During the winter of 1932 and 1933, nearly 800 cords of fuel wood were removed in improvement cuttings. All of this wood was sold on the stump at 25c. per face cord. (12″ to 14″) Payment was made in labor during the late spring and summer. Nearly all of the men who cut this wood were unemployed so that they had an opportunity to provide themselves with fuel without an expenditure of money. About 25 acres is laid off for recreational use. Ten or twelve acres of this has been developed for picnic parties and opened to the public without charge. Roadways, trails, fire places, tables and benches have been constructed for the convenience of the public. All of this work was done by the wood cutters in payment for their fuel wood. Materials for fire places and benches came largely from the area. Over 4,000 persons registered from May 21 to September 20. By actual counts made on several occasions during the summer it was found that only from 25 per cent to 30 per cent signed the register. On this basis, we estimate an attendance of from 10,000 to 12,000 persons for the four months.—W. J. ENDERSBEE, *Pulaski, N. Y.*

BRIEFER ARTICLES AND NOTES

The N. R. A. and Wild Life Conservation

The Biological Survey has received an allotment of $971,550 under the National Industrial Recovery Act. Of this amount approximately $198,350 is to be applied to the construction of boats and docking facilities in the states and in Alaska for patrol work; $21,000 for administration buildings in Alaska; and the remainder of approximately $752,200 for development work on wild life refuges and experimental stations throughout the United States.

The major operations on the refuges will be directed to the location, monumenting, and marking boundaries of many refuges throughout the country. Most of these were withdrawn for refuge purposes years ago, but have never been suitably demarcated on the ground, consequently, administration of them has been difficult. On other refuges it is planned to undertake development work designed to improve the sanctuaries through restoration of natural conditions or by modifications that will improve the extensive water supply. Outstanding in this class is the construction of dams, dikes, and fills for the conservation of water on the Big Lake Refuge in northeast Arkansas. This area in its primeval condition was a favorite haunt of wild water fowl in their migration during the spring and fall, but because of drainage developments in that region, its natural attractions have been almost completely destroyed. The Biological Survey plans when completed will bring about conditions approaching those pertaining before drainage work modified the character of the area. Through the acquisition of lands at the south end of Salton Sea, a surface area of 45,600 acres has been established as the Salton Sea Migratory Bird Refuge. A great quantity of fresh water from the Imperial Irrigation District now flows into the sea within the limits of the refuge where it now mixes with the brackish waters of the sea. The objective here is to impound this fresh water so as to make it more productive of aquatic plant life relished by migratory water fowl, thus attracting birds to the place in larger numbers than heretofore.

Blackbeard Island Refuge in Georgia is in the Atlantic Coast fly-away and should normally attract a great many birds during the migration seasons, but there is a deficiency of fresh water and food here, consequently, plans have been developed and approved for the creation of fresh water ponds. The water supply for these ponds will be obtained by tapping artesian water supply.

The Crescent Lake Refuge in the sand hill region of western Nebraska is studded with numerous lakes and ponds famous as concentration places for migratory water fowl in nesting season. Prior to the purchase of about 40,000 acres here by the Biological Survey, part of the lake system had been partially destroyed through the construction of drainage canals. The plan here is to install suitable controls to maintain desired water levels on these lake beds.

Railroad Valley Migratory Bird Refuge, Nevada, is situated in the heart of a tremendous scope of arid land which is traversed by migratory birds with rare opportunity to stop for rest and feed, but previously some artesian water has been

developed here and it is the plan of the Biological Survey to conserve this by impoundment and to sink other wells to increase the water supply, thus making an attractive stopping place for ducks and geese in their migration.

In the north central part of Oklahoma about 19,500 acres have been set aside for refuge purposes. This place is known as Salt Plains and is contiguous to the Salt Fork of the Arkansas River. During the flood stages of this stream and the tributaries of it a large volume of water flows across the plains, but is quickly dissipated. It is planned to construct suitable dikes and control works here in order that this run-off can be controlled and thus a permanent water supply created and used as a resting and feeding place within the Great Plains migratory bird fly-away.

Altogether the opportunity presented by the National Industrial Recovery Act for the development of refuges is the most pretentious and widespread ever offered. With the serious depletion of wild water fowl and the destruction of many of their natural haunts, the benefits accruing will not only alleviate in some degree the unemployment situation, but will greatly benefit migratory wild life.

RUDOLPH DIFFENBACH,
U. S. Biological Survey.

FEDERAL PURCHASE OF 954,632 ACRES OF FOREST LAND APPROVED BY COMMISSION

In furtherance of the federal forest acquisition policy, as outlined by L. F. Kneipp[1] in the November JOURNAL the National Forest Reservation Commission, on October 30, approved the purchase of 954,632 acres in 36 national forests and purchase units in 20 states east of the Great Plains. The total cost to the government will be $2,024,421, or an average of $2.11 per acre. Options already have been taken on the lands by the Forest Service. The new areas will be immediately available for improvement work by units of the Civilian Conservation Corps, under agreements included in the options.

Among the larger purchases approved were 225,738 acres in the Apalachicola Purchase Unit in Florida; 151,144 acres in the Monongahela National Forest, West Virginia; 75,320 acres in the Chickasawhay and 94,695 acres in the Leaf River Units, both in Mississippi; 68,480 acres in the Manistee Unit in Michigan; and 67,952 acres in the Kisatchie and 60,423 acres in the Vernon Units, both in Louisiana.

Enlargement of the exterior boundaries of the Cumberland Unit in Kentucky, the Wambaw Unit in South Carolina and the Apalachicola Unit in Florida also was approved by the Commission. The Black River Purchase Unit in South Carolina, tentatively established several years ago, will be abandoned.

Two additional proposals of sale were considered, and the Commission requested the Forest Service to make examinations and report. One of these, the Battell Forest in Vermont has been offered for sale to the government for national forest administration by the president of Middlebury College. The other known as the Tionesta area comprises lands within the boundaries of the Allegheny National Forest, Pennsylvania, which supports the largest remaining stand of virgin hemlock-hardwood type forest in Pennsylvania. The area is believed to offer unusual opportunities for scientific research, education, and inspiration. Its purchase has been recommended by the Pennsylvania Forestry Association.

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[1]Kneipp, L. F. Uncle Sam As a Buyer of Forest Lands. JOURNAL OF FORESTRY, November, 1933, pp. 778-782.

The Swedish Private Forest Law

In the "Deutsche Forstwirt" for September 15 (Vol. 15, No. 74, p. 467-468) occurs a most illuminating report on the workings of the Swedish law governing private forests by Graf Schulenburg-Lieberose, from which the following is taken.

Sustained yield forest management is essential for the existence of Sweden. The old law of 1903 which required private owners to maintain a forest cover on all forest land, proved inadequate during the war and after-war years when heavy cuttings were made. Therefore, in 1923, the so-called Forest Maintenance Law was passed which has worked smoothly and has found imitators elsewhere in Europe, particularly in Finland.

The chief points of this law are:

1. That forest soil must be continuously under forest cover. If an owner wishes to convert it into garden or pasture he must first obtain permission.

2. Cutting in young stands must be confined to thinnings; in old stands it must be done in such a way as to assure natural regeneration, or failing this plans must be made for planting the cut-over areas.

3. In case of cutting contrary to these provisions, the owner can be enjoined from further cutting by the so-called Forest Protective Bureau (in German, Waldschutzbehörde).

These bureaus date from 1905. They have the task not only of checking the management of private forests, but also of giving aid by precept and example to private timberland owners.

The unit of control is the Forest Protective Committee (in German, Waldschutz Kommittee) consisting of three persons of which two are chosen locally, the third being appointed by the Forest Protective Bureau. These men serve without salary. The committee reports to the bureau of the regional government unit (in German, Regierungsbezirk). These bureaus also consist of three persons, one named by the King, one by the Provincial Legislature and one by the Agricultural Society. They serve without pay and for a term of three years.

Next to the bureaus stands the technical staff,—at the head the regional forester, with assistants of various grades, all technically trained. These assistants are quasi-government officials and receive the customary salary of their grades.

The means for maintaining the Bureau is a severance (yield) tax of 1.3 per cent of the net value of the cut, aided by direct appropriations of the state, of the Provincial Legislature and of the Agricultural Society. In addition, most bureaus sell nursery stock, seed, etc., and charge the owners for the technical services performed by the staff.

Great rivalry exists among the different bureaus to show the best results. This led to the forming of a central association of the bureaus (in Swedish Skogsvardstyrelservas forbünd) the articles of which were approved by the King. This association is the spear head of enforcement and has as its task the furthering of the work of the individual bureas, the securing of uniform law observance by the private owners and the gathering of statistics, making of reports, etc. It meets only every third year, functioning meanwhile through a central council ("Zentralrat") composed of eight members, one from each governmental unit ("Bezirk"), also one member and alternate appointed by the King. Two regional foresters sit with the Council as "observers."

In the late summer and fall the plans for the winter's cut are worked out, in the spring and early summer the staff is busy marking timber for cutting,—for which so many requests are received as to make necessary higher charges for those received after a certain closing date. The foresters travel from place to place in doing this marking and seek also to educate the owner in the principal

points of proper forest management.

In case of forests with insufficient growing stock of timber, a simple cruise and working plan is made from which the owner binds himself not to depart for the next five years without the permission of the Regional Bureau. This is to assure sufficient material for future local timber needs.

In the winter, the staff supervises cuttings and gives advice to owners on correct technical practice. Lectures and demonstration trips help to educate the owners. In the spring time, the staff is busy directing planting operations.

Notable is the success of this Swedish Law; it has worked without friction and with negligibly few instances of penalties for non-performance, which may, however, include seizing of the timber cut contrary to provisions of the law and to the orders of authorities.

A. B. Recknagel,
Cornell University.

Switzerland's "Copeland Report"

"Raw wood, a national product 'par excellence' is better suited than any other material to be improved, worked, and adapted. Although a campaign in favor of wood is of particular interest to the industries concerned, it is certain, on the other hand, that the state cannot stay on the outside in this movement." These words come from Switzerland, the pioneer federation of the world, and outline the course of action to be taken by that nation in combating the encroachment of substitutes on her wood consuming industries—they apply equally well to the situation in the United States.

In what may be termed the "Copeland report of Switzerland," B. Bavier, Cantonal Forest Inspector, Coire, vividly portrays that the federal government has a definite obligation to support and develop wood industries. In Wurtemberg it is estimated that the consumption of wood has already fallen off 30 per cent due largely to certain prejudices and fashion. The replacement of wood by other materials is successfully attempted in a wide range of manufactured products as varied as furniture, tanks, containers, vehicles, implements, and sporting goods. Wooden floors, doors, sash, and trim are disappearing from the construction of commercial buildings. The Swiss are striving not only to recapture lost markets but to retain the present market with the support of the state and all other resources available to the forest growers and forest users. Unlike the United States, whose forest problems closely parallel theirs, the Swiss give greater emphasis to scientific and technical research, directed toward better knowledge of materials, cheaper and more efficient production, the modification or processing of materials, and their application to new uses.

The Swiss especially emphasize the fact that forest crops have a high economic value, the value and uses of which should be strengthened to encourage forest growth —a fact long pointed out by the U. S. Forest Service, but given a much less important rôle in national forest development. In Switzerland, as in the United States, forest products constitute in many communities the principal source of revenue and in addition furnish full-time jobs for thousands of citizens, willing and anxious for work.

After giving details of the large number engaged in woodworking shops, wood pulp and cellulose mills, and wholesale and retail establishments, the Swiss report states, "Figures relative to the number of enterprises and persons employed should not be considered by themselves; but account should also be taken of the organization which characterizes these enterprises and the fact that they are distributed in all parts of the country. . . .

It appears from such an economic-social organization, as well as from the total number of factories and personnel employed, that the state must support and develop the wood industries."

To all the foregoing, which have their parallels here, should be added the fact that the use of forest products in the United States is a very vital factor in solving the national problem of land use. The area of forest land is rapidly increasing due to farm abandonment at a time when American markets for forest products are decreasing. A very large proportion of our potential forest crops must be for cutting, marketing, and use if there is to be an adequate economic return for public and private forestry. The restoration of vast areas of idle land to productive use is a practical impossibility without useful and profitable markets for forest products.

It is worthy of the note of American foresters that Switzerland, whose very origin lies in the defensive alliances of 1291 between the forest districts and whose citizens initiated forest projects as protection against damage due to the forces of nature as early as 1834, should again step boldly forward by firmly linking her forestry problems with forest products research and wood utilization.

Annual Meeting of the Association of State Foresters

The State Forester's Association held its annual meeting this year October 15th to 18th. The members and their guests assembled Sunday afternoon and evening, October 15, at the Brown Hotel in Louisville, Kentucky. They left early the next morning by bus and auto on a three-day tour through Indiana, visiting several of the state forests and parks and the C C.C. camps connected with them. The first night out was spent at French Lick Springs, the second at the Brown County State Park, and the meeting wound up on the third night at the Dunes State Park in the northern part of the state. There were some fourteen state foresters in attendance. Guests from among the federal forest officers, extension foresters, and the Purdue Forest School faculty brought the total attendance up to between twenty-five and thirty.

Business sessions were held every evening. At the Brown County State Park session, Franklin Reed, Executive Secretary of the Society of American Foresters, spoke on Article X of the Lumber Code and the plans for the coming conference on it. The interest and attention of the meeting centered almost entirely around the Emergency Conservation Work, which plainly has absorbed the time and energy of all state foresters to the practical exclusion of everything else. Several important and carefully thought out resolutions regarding it were adopted and transmitted to the people concerned.

Resolutions adopted by most associations at their annual meetings are rarely much more than a polite gesture. They are usually framed by a committee behind closed doors and brought out on the floor only in the closing hour when everybody is in a rush to get away and therefore really intelligent consideration is lacking.

The State Forester's Association does not act in this way. Its resolutions are subject to the most thorough consideration and discussion from the floor, (sometimes through more than one session), and when finally adopted actually do represent the intelligent consensus of opinion of those in attendance.

Harry Lee Baker, of Florida, was elected President for the coming year to succeed W. G. Howard of New York. George Phillips of Oklahoma was re-elected Secretary.

Franklin Reed,
Society of Amer. Foresters.

F. A. Silcox Selected to Head Forest Service

The selection of F. A. Silcox as Chief Forester of the U. S. Forest Service has been announced by Secretary of Agriculture Wallace with the approval of President Roosevelt. Mr. Silcox succeeds Major R. Y. Stuart, whose death occurred on October 23. He took office on November 15.

The new chief forester had much to do with the administration of the national forests in the early days of the Forest Service and did some work for the old Bureau of Forestry which preceded the present organization. In later years he handled labor problems in shipyards and industrial relation problems for the printing industry. He comes to the Forest Service now from his position of Director of Industrial Relations for the New York Employing Printers Association.

Ferdinand Augustus Silcox was born at Columbus, Ga., December 25, 1882. He is a graduate of the College of Charleston, Charleston, S. C., where he received the degree of B. S. in 1903. In 1905 he finished at the School of Forestry, Yale University, with the degree of M. F. Prior to his graduation from the Yale School of Forestry he assisted in forestry research work in the Bureau of Forestry of the Department of Agriculture. Immediately following his graduation he entered the Forest Service as a ranger in Colorado where he was assigned to duty in the Leadville National Forest. Shortly thereafter he was placed in charge of the Holy Cross National Forest in that state and soon was sent to the San Juan and Montezuma National Forests in the same state to set up administrative organizations. The following year he was transferred to Montana as forest inspector and when a district office was set up at Missoula, Montana, in 1908 he was made associate district forester. He was appointed district forester for the Northern Rocky Mountain region in 1911, remaining there until 1917.

At the outbreak of the World War he entered the Forest Engineer's Branch of the American Expeditionary Forces as captain and was later promoted to the rank of major. After less than a year's service in this branch, he was selected by the Secretary of Labor and the Shipping Board to head a bureau to handle all labor problems at the shipyards at Seattle, Wash. Following the war he went to Chicago as Director of Industrial Relations for the commercial printing industry, remaining there until 1922 when he became Director of Industrial Relations of the New York Employing Printers' Association.

Mr. Silcox is a member of the National Forest Policy Commission and a senior member of the Society of American Foresters.

University of California Now Has a School Forest of the Highest Class

The Michigan-California Lumber Company has given to the University of California a most excellent tract of second-growth forest. This comes as a result of the generous action of Mr. John W. Blodgett of Grand Rapids, Michigan, president of the company, past president of the National Lumber Manufacturers' Association, and member of ex-President Hoover's Timber Conservation Board, and as a result of the active interest of Major Swift Berry of Camino, California, general manager for the company. In offering the property to the University, Mr. Blodgett said: "It is felt that the work of the University of California in teaching the profession of forestry would be materially aided by its possession of a school forest upon which practical demonstration of the work could be given. This would be of value both directly to the students and indirectly

as a demonstration to the public. Therefore we desire to offer to donate to the University of California the title to about 2,600 acres of our cut-over land to be managed under forestry principles by the Division of Forestry of the University."

The tract is located in the optimum sugar pine-ponderosa pine zone of the central Sierra. It is near Placerville, California (the "Hangtown" of Forty-niner days), and is within the boundaries of the Eldorado National Forest. After nation-wide searching for the most favorable location, the Institute of Forest Genetics was, in 1925, located in the same region because of the wonderfully fine growing conditions for pine. The University of California's new tract is at a higher elevation than that of the Institute of Forest Genetics but still in the zone of very excellent forest conditions. Originally it contained one of the finest stands of sugar pine to be found anywhere. Soil, rainfall, growing season and topographic conditions are admirable.

About 700 acres is brush-covered as the result of past fires; but this area also is of excellent quality and capable of again producing first-class forest. The other 1,900 acres are covered with high grade second-growth which has been carefully protected for many years by the Michigan-California Lumber Company. Sugar pine is unusually abundant in the young stand.

One of California's state highways comes to within thirteen miles of the tract and the area itself is crossed by two good county roads. The tract is located only a few miles from Colomo, where John Marshall made California's first big find of gold, leading to the gold invasion of '49.

The staff of the Eldorado National Forest, the men of the California Region of the U. S. Forest Service and of the California Forest Experiment Station have all been most generous and helpful in making arrangements and providing equipment. The State Board of Forestry has also been of great assistance in that they are providing the fire protection service. As the property is located within the boundaries of the Eldorado National Forest the actual work of protection will be done by the federal government for which it will be recompensed by the State of California.

Professor Myron E. Krueger, logging engineer on the University of California faculty of forestry, has been put in charge of the tract.

The Division of Forestry plans to use the area for research by faculty and graduate students and for demonstration purposes. For the present, at least, its permanent summer camp for under-graduate students will be continued at Meadow Valley, in the Plumas National Forest.

WALTER MULFORD,
University of California.

A SIMPLE DIAMETER TAPE

In order to take diameter measurements on a plot of small locust trees, it recently became necessary to improvise a tape for the purpose.

A large sheet of cellophane (which had come as wrapping on a shirt) happened to be available. With this as an envelope, and a narrow strip of paper as a scale, a very serviceable tape was constructed. In making this tape, the corresponding circumferences for diameters from 1 to 5 inches, in tenths of inches, were computed and measured by rule on a strip of paper about 18 inches long and one fourth of an inch wide—later a strip of tracing cloth was used in place of the paper. Around this a strip of cellophane 2 inches wide was folded several times and then tightly creased by pulling it back and forth over the edge of a plank. Thus a strip of paper bearing the scale

became encased in a tough sleeve which bore all of the tension. Several inches of cellophane extending beyond the paper on each end served as handles. Rapid and accurate measurements are possible by the use of this tape; its cost is practically nothing, and owing to the present wide use of cellophane it could be improvised almost anywhere. Furthermore, it has advantages in that the ordinary steel tape is cumbersome for use on small saplings because of its stiffness and its tendency to kink, while a linen tape soils quickly in such use.

F. C. CRAIGHEAD,
Bureau of Entomology.

FELLOWSHIPS AVAILABLE

The Charles Lathrop Pack Forest Education Board is now receiving applications for its fifth annual award of fellowships for training leaders in forestry.

The purpose of these fellowships is to encourage men who have shown unusual intellectual and personal qualities to obtain training that will best equip them for responsible work, either in the general practice of forestry, in the forest industries, in the teaching of forestry, in forest research, or in the development of public forest policy.

Approximately five fellowships will be available this year, and will range from $500 to $1,500 although in special cases higher sums may be authorized by the Board. Appointments may be made for twelve months or for longer or shorter periods, in accordance with the scope of the work, and may be renewed at the discretion of the Board. The amount of the grants will in each case be determined by individual circumstances.

The awards will be made to men who demonstrate natural powers of intellectual and personal leadership and who intend to make forestry their life work. There are no restrictions as to age, educational status or personal experience, but ordinarily fellowships will be granted only to men of American or Canadian citizenship who have finished an undergraduate college course or its equivalent. Special emphasis is placed on character, intellect, imagination, industry and personal interest in forestry. The Board seeks all possible information concerning candidates from former teachers, associates, employers, and others.

Appointments will be made by the Board on recommendation of a Committee on Appointments, consisting of Henry S. Graves, John Foley, and Tom Gill.

Applications will be received by the Board until December 31, 1933, and should be made on forms supplied by the Board. Application forms, as well as further information regarding the fellowships, may be had from the Secretary of the Board, Tom Gill, 1214 Sixteenth Street, N. W., Washington, D. C.

SCIENCE SERVICE ABSTRACTS JOURNAL OF FORESTRY

Science Service is the unique institution established for the purpose of disseminating scientific information to the public. It acts as a liaison agency between scientific circles and the world at large. This Service receives regularly proofs of articles that appear in the JOURNAL OF FORESTRY, and many of these articles have been commented on most favorably by them. Science Service issues more than seven regular syndicate services which carry to over ninety subscribing newspapers and other publications in this country and abroad, authentic accounts of current scientific progress in all fields. This publicity insures a wide reading of the JOURNAL OF FORESTRY.

Institute of Forest Genetics Receives Award

Supplementing its grant of $2,100.00 last spring, the Carnegie Institution of Washington has just made a grant of $2,800.00 as emergency aid to the Institute of Forest Genetics, located at Placerville, California.

Deadwood Lying on Duff Drier Than in Air

Some 23 years ago the lopping of brush and branchwood was advocated by Graves, in his "Protection of Forests from Fire," as a method of hastening the decay of such forest fire fuels. Most foresters probably accept this recommendation without question, reasoning that when such sticks are in contact with the ground they do not dry out so rapidly nor to such low moisture contents as when they are supported above the ground and thereby exposed to drying winds. Some recent measurements at the Priest River Branch of the Northern Rocky Mountain Experiment Station show, however, that this is not always true.

These measurements were made to compare the moisture contents of samples representing dead branchwood one-half inch in diameter and 18 inches long buried just beneath the surface of the duff, lying on top of the duff, and supported 10 inches above the duff. Two sticks were used in each exposure, and the measurements included 13 consecutive days at the peak of the 1933 fire season. The sticks lay in a horizontal position, and after each weighing they were returned to their original beds, with the tagged end always pointing north and the same side always exposed upward.

The average moisture contents, on the basis of the oven-dry weights of the sticks, were found to be:

	Per cent
Buried just under the duff surface	4.19
Lying on top of the duff	3.84
Supported 10 inches above the duff	6.21

The outstanding reason for this relationship is believed to lie in the seldom recognized fact that the earth surface heats the air by absorbing short-wave light rays and converting them into longer waves called heat. In this process the earth or duff surface becomes much hotter than the air, the maximum temperatures in the duff running from 100° F. to 158° during this particular test. Standard maximum temperatures of the air in a nearby U. S. Weather Bureau instrument shelter ran from 77° to 100° during this same period.

Under such conditions the sticks lying on the duff surface became the hottest and the driest, due to radiation, conduction, and convection. Those buried just beneath the surface were heated, largely by radiation and conduction, almost as much and therefore lost nearly as much moisture. While the sticks held on brackets 10 inches above the ground received practically no conducted heat and so little radiant and convected energy from the sides and from beneath that they remained the wettest in spite of their greater exposure to the proverbial "drying winds." Apparently this is a case in which the important factor is heat rather than air movement.

The significance of this qualification of what might be called a traditional belief among foresters lies in its application to both slash disposal and fire control. In a climate such as that of northern Idaho, deadwood lying directly upon or just under the duff surface will be heated on clear days more than it will if supported above the ground. Consequently it will lose moisture more rapidly, drop more quickly below the moisture content necessary for bacterial and fungal action, and experience less hours favorable to decay and more hours of high and extreme

inflammability. In fact, during the peak of a fire season the driest and most inflammable sticks of wood will be those lying directly on the duff or ground surface.

Consequently, in this region, the lopping and scattering of branches, and the trampling and breakage of such material by livestock, may possibly produce a slower rate of decay than occurs in windrowed or piled slash, where the inner pieces are partially shaded and retain a higher moisture content. Likewise, in the control of small fires a smokechaser may be able most easily to prevent rapid spread of fire by throwing aside all deadwood from a narrow lane around the fire before commencing to dig the trench through the duff, which at its driest carries fire only slowly.

H. T. Gisborne,
Northern Rocky Mountain Forest and Range Experiment Station.

Cupressus Lusitanica as a Suitable Tree for East Texas

Cupressus lusitanica, according to L. H. Bailey's Cyclopedia of Horticulture (1914), Volume II, page 916, is "cultivated in Portugal and naturalized, possibly introduced from India." E. A. McIlhenny, president of Jungle Gardens, Inc., Avery Island, La., says,[1] "Cupressus lusitanica is a highland cypress which came originally from the mountains of Mexico and has been grown for a great many years as a timber tree in certain parts of Portugal. . . ."

Continuing, Mr. McIlhenny states,[1] "It is the quickest growing tree we have ever seen in this locality.[2] We have trees three years old that are now 16 feet high and 5 inches through. The description of the tree by those who have seen it grow in Portugal is that the bowl of a tree 50 years old is 80 feet in the clear with a trunk 3 or 4 feet through."

In a later letter[3] to R. E. Karper, Vice-Director of the Texas Agriculture Experiment Station, Mr. McIlhenny suggests that *Cupressus lusitanica* "has great possibilities as a timber tree for the South. . . . We do not belive it will thrive and grow regularly where the temperature regularly goes below zero Fahrenheit."

Not finding any information concerning this species aside from that quoted above, the Texas Forest Service and the Texas Agricultural Experiment Station decided to purchase 100 of the trees and give them a trial as forest and ornamental trees.

Accordingly, in December 1930, 100 *Cupressus lusitanica*, 1-year old, once transplanted and 6 to 8 inches high, were ordered from Jungle Gardens, Inc., of Avery Island, Louisiana. These trees were grown by this company, according to the information given by them, from seed secured direct from Portugal.

The trees, balled and burlapped, were delivered to the State Forest near Conroe, Texas, January 1, 1931, after which they were immediately re-distributed as follows:

	Trees
TEXAS AGRICULTURAL EXPERIMENT STATION SYSTEM	
Substation No. 1, Beeville, Texas	8
Substation No. 3, Angleton, Texas	8
Substation No. 4, Beaumont, Texas	8
Substation No. 15, Weslaco, Texas	8
Substation No. 19, Winterhaven, Texas	8
Main Station Farm, College Station, Texas	8
TEXAS FOREST SERVICE	
State Forest No. 1, Newton County	26
State Forest No. 2, Montgomery County	26

[1] Letter, Nov. 25, 1930.
[2] Avery Island, La.
[3] Dec. 11, 1930.

TEXAS FOREST SERVICE RESULTS

In the following comments only the trees planted by the Texas Forest Service are considered:

The trees were received in excellent condition at each of the two state forests mentioned. Twenty-four of them were planted at each forest, with a 6′ x 6′ spacing on forest land considered typical of the surrounding area. The remaining two were set out for trial as ornamentals on the forest headquarters grounds.

At State Forest No 1, the two *Cupressus lusitanica* set out as ornamentals grew luxuriously and made beautiful specimens after being planted in prepared earth that contained 3 wheelbarrow loads of barnyard fertilizer (cow) per tree. Additional fertilizer was added in 1932 and the ground around the trees was kept well cultivated.

The 24 trees set out on forest land were given no further care. Two were dead in May 1932. One more died during the summer of 1932. The average height growth of the trees during 1932 was nine-tenths of a foot, and the tallest tree reached to 3 feet 8 inches. Range cattle did not bother the trees.

In February, 1933, after new growth had started following rains and warm days, killing frosts on the 8th and 9th with minimums of 11° and 12° respectively, caused the death of the two ornamental specimens and severly injured the forest planting, several of the trees being killed outright, and the remainder being considerably weakened.

At State Forest No. 2, the two Cupressus *lusitanica* set out as ornamentals did not receive fertilizer and were given no special care. One died from an accidental dose of acid. The other grew thriftily through 1932.

The twenty-four trees set out under forest conditions grew well through 1932. However, their fresh shoots were found edible by range cattle and it was necessary to fence the plantation. The average tree was 31.2 inches tall in December 1931 and 45.4 inches tall in December 1932.

In February, 1933, it was cold enough to freeze ice each night from the 7th to 12th inclusive, with a minimum temperature of 8°. Only three trees survived this severe weather and they died before the summer of 1933 passed.

CONCLUSIONS

From the results noted above it is clear that Cupressus lusitanica is not a suitable forest or ornamental tree for the commercial timber region of East Texas.

a. It prefers a richer soil than is commonly found outside the bottomlands of the region.

b. It cannot stand minimum temperatures of 11° Fahrenheit, a temperature not uncommon to the "piney woods" area.

C. B. WEBSTER,
Texas Forest Service.

ERRATA

On page 876 of the November, 1933, JOURNAL, the name of W. K. Williams is listed as "Dropped for non-payment of dues." This is incorrect. The name should read "K. F. Williams."

The following corrections should be made in the article "Basal Fire Wounds on Some Southern Appalachian Hardwoods" by Nelson, Sims and Abell which appeared in the November 1933 issue of the JOURNAL OF FORESTRY:

1. On page 832, Table 1, the symbol σ b (sigma b) should be substituted for the symbol δ (delta).

2. The following footnote should accompany Table 1:

b = Regression coefficient
σb = Standard error of regression coefficient
R = Coefficient of multiple correlation with its standard error.

3. In Table 2, on page 833, the column heading σ b should be substituted for δ.

4. In the title for Table 3, the word "correlative" should read "correlating".

REVIEWS

Stumpage and Log Prices for the Calendar Years 1931 and 1932. By Henry B. Steer. *U. S. Dept. of Agric. Statistical Bulletin 44. 135 pp. Dec., 1933.*

The most recent of the series of bulletins on stumpage and log prices just being issued by the Forest Service is particularly timely because of the interest in these prices shown by producers and consumers in connection with the cost protection provisions of the Lumber and Timber Products Code. Although there was a marked shrinkage from previous years in both number and average size of transactions, as was to be expected, the data are nevertheless based upon sufficient numbers of sales in all forest regions to give a fair cross-section of the price situation.

Prices by species, by type of sale, and by states, are shown in much the same form as in bulletins for 1928, 1929, and 1930 (Statistical Bulletins 32, 36, and 37). Generally speaking, both stumpage and log prices remained at relatively higher levels in the East than in the West. The average weighted stumpage prices for the country as a whole, adjusted for changes in the proportions of the different species, showed a decline of 20.8 per cent from 1930 to 1931 and 3.8 per cent from 1931 to 1932. For the same years, log prices declined 17.9 and 17 per cent, respectively.

A few copies of the bulletin are available for distribution by the Forest Service, and may be had upon request.

W. N. Sparhawk,
U. S. Forest Service.

Der Einfluss der okonomischen ge sellschaften auf die Entstehung einer eigentlichen Forstwirtschaf in der Schweiz. (The Influence of Economic Associations on the Rise of Rational Forest Practice in Switzerland.) By Dr. Heinrich Grossmann. *Beiheft zu den Zeit. de Schweizerischen Forstvereins Nr. 9 S. 1-87. 1932.*

From paleobotanical researches it i known that Central Europe had a drie and warmer climate during the Stone Age Mixed forest of oak, linden and elm with spruce and fir covered much of Switzer land. The early inhabitants destroyed much of the lower forest to make grazing lands, and this as well as climatic change have since favored encroachment of spruce and fir at the expense of hardwoods. With this introduction Dr. Grossmann traces the social and political backgrounds o the development of Swiss forestry.

During the 17th century the lot of th peasant became worse and worse and re sulted in continually greater forest de vastation. Greater inroads were constantly made into the forest for fuel, tanbark gum, cattle bedding and mast for hog At one time the forests were evaluated by the number of hogs they would suppor per unit area. In spite of the awakening of literature, art and natural sciences, ye industry, agriculture and forestry were still very primitive in the 18th century A third of every field was always fallow and production of crops became less and less as a result of deficient fertilization Forestry was closely bound to agriculture Forest pasturage was submitted to the same system of keeping one-third un

grazed in rotation. The greater part of the forest was in communal ownership and foresters had chiefly police powers. True government forests did not exist before 1800. While forests near settlements became greatly impoverished and exhausted more remote woods were untouched owing to transport difficulties. Regulations aimed chiefly at conserving the existing supply from waste, not at cultural measures. Meanwhile the debates of the Kameralists and their successors, the founders of forestry practice, in Germany did not penetrate Switzerland.

In 1759, however, the Economic Society of Bern was founded, with a program for an investigation of natural resources and a plan for action. The outline for the survey was most comprehensive and suggestive of some of the recent land economic surveys of this country; in forestry matters it was even more ambitious, outlining a whole program for forest research, a study of the best silvicultural systems to use, etc. Much had been learned of forestry by members of the committee on their travels in other lands. N. E. Tscharner was assigned the forestry work and within the next decade published several excellent forestry books besides his official reports. There were also many forestry works by other authors, among them a botanical study of *Robinia pseudacacia* L. giving its natural home as Siberia! Tscharner also instituted lectures on forestry to farmers.

Soon similar societies sprang up in other cantons, and attention became directed to the evils of forest grazing and removal of litter. It was natural that with the prevalence of timber thefts, and destructive overcutting, the authorities turned first to attempts to decrease the use of wood by encouragement of substitutes and prohibitions; only later did it occur to increase production of the forests. Much interest for the productive side of forestry was initiated by the prize essay contests held by the Physical Society at Zürich from 1862-1868. These were all won by Götschi, the son of a forest official stationed near the present Sihlwald. Subsequently he addressed a memorandum to the authorities suggesting more aggressive measures to increase production rather than a purely negative policy of policing the forests. His efforts were successful and in 1770 the first permanent sample plot was established! Needless to say Götschi soon arose to a position of importance in the forest service. Directly or indirectly the economic societies and their forest commissions were thus laying the foundations and giving the impetus to construction forestry effort.

It seems hardly necessary to point out how often history repeats itself, even in forestry. In reading Dr. Grossman's essay one is impressed with obvious parallelisms with the United States—the individual states, like the Swiss cantons. The initial reaction to the timber famine scare, as in this country, gave a boost to wood substitutes. With us it was perhaps more serious due to the relative abundance and cheapness of coal, steel, cement, etc. We have gone through conservation congresses, Capper reports and Timber crop reports until—as the latest report of the Forester suggests—we are less in danger of a wood famine than in the loss of markets for the lower grade forest products. What is needed is increased consumption of fuelwood, and small products in order to clear the land for the production of valuable timber. (A shortage of quality timber is already existent in many regions.) It is a long way from Götschi to the present Winterthur or Covet forests, and no one can foresee the future of American forestry. The similar history of forestry in so many different countries is surely an abundant reason for including a study of it in forest schools. Dr. Grossman's pamphlet, carefully documented, is an excellent historical study of the formative period of forestry in Switzerland, and would provide good material for such a course.

HENRY I. BALDWIN,
N. H. Forestry Dept.

Studies on Tree Roots. By E. V. Laing. *Forestry Commission Bulletin 13. Published by His Majesty's Stationery Office. London, England. 1932. pp. 72, 8 figs., 17 photo pls. 2 s. Od.*

Tree roots and mycorrhizae or the association of fungi and roots have commanded considerable attention among foresters during the past few years. This timely publication briefly summarizes the work of other investigators in this field as well as discussing Laing's own investigations. The bulletin deals almost entirely with coniferous species and genera.

The introduction briefly treats with the anatomy of the various coniferous root systems, including the two types of root tips. One form possesses a root cap which protects the growing apex from damage while it is progressing through the soil. The second type has no root cap and occurs when the apex becomes enveloped with fungus hyphae. This formation is called a fungus-root or mycorrhiza.

In discussing the forms of mycorrhizae, the author deals only with the ectotrophic and endotrophic types and omits the ectendotrophic form described by Melin.[1] Ectotrophic mycorrhizae are characterized by a mat of fungous hyphae which completely envelops the root and forms a net in the intercellular spaces of the cortex. Endotrophic mycorrhizae are characterized by the mycelial invasion of the cells of the root. Ectendotrophic mycorrhizae possess the combined characteristics of ectotrophic and endotrophic mycorrhizae. The difference of opinion regarding the formation of these types is also omitted. Rayner,[2] whose 1927 publication is omitted from reference, believes that the type of mycorrhizae depends upon the degree of fungous infection of the root. Melin, however, believes that the various forms represent stages in development, in which the ectotrophic type is the final phase.

The modification of root development by mycorrhizal action is discussed briefly for each of several genera. The roots of Pinus are susceptible to the greatest modification, the rootlets being repeatedly dichotomously branched and containing formations of coralloid and ball bodies. In Picea and Pinus the rootlet is gradually destroyed by the fungus which acts as a root pruner.

Amanita, Boletus, Cortinarius, Lacterius and Russula are among the species of fungi which most commonly form mycorrhizae. One species of fungus may form mycorrhizae upon several genera. Mycorrhizae formation is generally greater on the more vigorous trees. This raises the question which has not been answered as yet, whether the better development of the tree infected with mycorrhizae is due to the fungus relationship or whether the vitality of the tree is high before infection, thus making the internal conditions of the plant more favorable to mycorrhizae formation. Soils which have previously borne tree crops generally produce a more luxuriant development of mycorrhizae than other soils. Certain minerals, such as calcium phosphate, magnesium carbonate, and ammonium sulphate, may stimulate development of mycorrhizae, depending upon the soil itself and the tree species used. Under certain conditions, mycorrhizae may not be produced even though mycorrhizae fungi are present. Lack of aeration will prohibit mycorrhizae development in peat soils.

Mycorrhizal fungi are often parasitic in peat soils, the infected roots being destroyed and many of them lost during the spring and summer. Parasitism raises the question as to whether the mycorrhizae are beneficial or harmful to the plant. The author, in discussing this difference of opin-

[1]Melin, E. 1925. Untersuchungen über die Bedentung der Baummykorriza. Gustav Fischer

[2]Rayner, M. C. 1927. Mycorrhiza: An Account of Non-pathogenic Infection by Fungi in Vascular Plants and Bryophytes. 246 pp., illus. London.

ion among investigators, summarizes the conclusions of Melin that "(1) The fungus or fungi do not fix atmospheric nitrogen. (2) Mycorrhizae develop to the highest degree where ammonium salts provide the source of nitrogen. For some fungi nitrates are favorable, for others unfavorable. (3) Mycorrhizae can utilize complicated nitrogen compounds more successfully than ordinary roots. (4) The best growth of mycorrhizae takes place in a medium with a pH value of about 5, but mycorrhiza tends to reduce acidity. (5) No evidence of parasitism is found in nature, but in pure culture if the plants are weak the fungus becomes parasitic." The author concludes that "there is a certain amount of evidence that the fungus is distinctly beneficial and there is also evidence that the fungus may be harmful. It is difficult as yet to obtain a proper balance of evidence."

Surface rooting habit appears to be characteristic of conifers planted in all kinds of peat soils. Although tree growth is checked until the development of an adventitious root system, the development of such a system will not necessarily cause a continuation of growth. The period of cessation of growth is longest where the surface horizons of peat are not decomposed and shortest where the surface horizons are well decomposed. Until the canopy is closed, only the surface six inches of peat are utilized by tree roots; consequently the tree growth depends upon the quality of this surface horizon.

Each of the factors causing the surface spread of roots in peat soils is discussed. These factors include height of water table, aeration, toxicity, reducing properties of peat, point of origin of the roots, mycorrhizae, concentration of the soils solution, nitrogen supply, iron deficiency, and weakening of the nursery root system. No mention is made of the possible effect of the kind of hole made by the planting tool used or the depth of planting upon the root systems of the various species. This development of adventitious roots near the surface may be due to too deep planting and possibly crowding of the roots. Rigg and Harrar[3] state that Sitka spruce [*Picea sitchensis* (Bongard) Carriere], western hemlock [*Tsuga heterophylla* (Raf.) Sargent], western white pine (*Pinus monticola* D. Don), western red cedar (*Thuja plicata* D. Don.) and Douglas fir [*Pseudotsuga taxifolia* (La Marck) Britton] naturally develop lateral roots in sphagnum bogs underlain with peat. These roots, which are usually but a few inches below the surface, seldom extend to a depth of more than two feet. In no case were living roots found in the sedge peat. On the other hand, Kelly[4] attributes the development of lateral roots on planted Norway pine (*Pinus resinosa* Solander), Scotch pine (*Pinus sylvestris* L.) and white pine (*Pinus strobus* L.) to shallow planting. Wilson[5] emphasizes the need for careful planting so as to obtain a correct spread of roots.

A discussion of the inhibition to growth of the leaves and stems of plants grown on peat soils includes the factors of temperature, light, calcium, and magnesium. While low temperatures and intense light are often unfavorable to the growth of certain species, magnesium and calcium may sometimes be used successfully to accelerate growth.

An experiment concerning the mineral requirements of Norway spruce (*Picea excelsa* Link.) and Sitka spruce seedlings, showed that the two species differ greatly in their mineral requirements and in their reaction to different minerals. The de-

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[3]Rigg, George B. and Harrar, E. S. 1931. The Root System of Trees Growing in Sphagnum. Am. Jour. Bot. 18: 6, 391-397.

[4]Kelley, A. P. 1930. II. Mycorrhiza Studies. The Duration of Certain Pine Mycorrhizae. Jour. For. 28:6, 849-852.

[5]Wilson, Ellwood. 1931. A Commercial Reforestation Project. Forestry 5:2, 108-119.

ficiency of any element (potassium, iron, calcium, nitrogen, phosphorus, and magnesium) affected shoot growth more than root growth.

Several pages are devoted to periodicity of root and shoot growth and relation of weight of root to weight of shoot. Laing says, "There is no appreciable root growth during the winter months in coniferous nursery plants, and there is thus agreement with Engler." Engler[6] found that the lower temperature limit for coniferous root growth is about 5-6°C. but he believed that the winter dormant period of coniferous roots might be hereditary. The reviewer wonders whether the cessation of root growth during the winter may not be due, in part at least, to low temperature. Stevens[7] found that the roots of a four-year-old white pine grown in a greenhouse grew approximately as fast in the winter as in the summer. This indicates that white pine may not require a dormant period or that the dormant period depends upon favorable temperature conditions.

Periodicity in root growth, shoot growth, starch accumulation, and growth of mycorrhizae is discussed briefly. Shoot growth commences first in the spring and is followed by root extension, and thereafter, throughout the growing season there is an interplay between stem and root development. After stem growth has ceased during the latter part of the year, root growth is still active. Although the starch accumulation in the older leaves and in the stem disappeared during the period of stem growth, there was no appreciable reduction in the starch stores of the roots, except for the roots which continued growth or gave rise to new roots. Tertiary roots of Pinus are produced during the first year. They may be small protuberances, or lengthened and they may be infected with mycelia but not branched, or infected with mycelia and branched. This dichotomy is the first stage usually recognized in the formation of typical mycorrhizae on Pinus. After these conditions of the tertiary root are developed, there is no further growth until the commencement of the second growing season. Subsequent to this, there are three or four growth periods as represented by constrictions or growth lines on the mycorrhizal body.

In conclusion, the author summarizes the relation of research in this field to forest planting. He emphasizes the need for the proper understanding of (1) the factors influencing plant habit and form, (2) the actual growth factors of the area before planting, and (3) the factors of plant succession. Knowledge of these factors is needed so that successful plantations may be quickly formed on sites which are unsatisfactory for tree growth. The need of future research along these lines for the accomplishment of this end is discussed.

The bulletin is printed on a good grade of paper and is attractively bound in a green cover. The text is well written, but does not contain enough descriptive detail to cover the subject fully. The figures and plates well illustrate the points which the author emphasizes. Although the bibliography of 48 references may be consistent with the brevity of the bulletin, the scope of the publication demands more references, especially those of recent origin.

H. F. MOREY,
Northeastern Forest Experiment Station

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[6]Engler, A. 1903. Untersuchungen über dar Wurszelwachstum der Holzarten. Mitteilungen der Zchweizerischen Centralanstalt für das forstliche Versuchswesen, 7:247-317.

[7]Stevens, C. L. 1931. Root Growth of White Pine. Yale University: School of Forestry Bulletin 32. New Haven, Connecticut.

Trees of North America (Exclusive of Mexico). Vol. I—The Conifers. By George Rex Green. *Edwards Bros. Ann Arbor, Michigan. 1933.*

The scope and purpose of Trees of North America is clearly set forth by the author in the preface of the book. "No one person," he states, "can be familiar with all the complicated and diverse aspects of so broad a field as general North American dendrology. A book covering such a broad field is simply a mosaic of the ideas of investigators in the various fields and regions. All that the author of a book such as this can hope to do is to arrange these ideas and the general information on trees into form so as to be more easily available and helpful to students and others interested in the subject. The writer is indebted, therefore, to the authors of various tree books, monographs and bulletins."

As a teacher of dendrology for some fifteen years, the reviewer has long felt the need of a satisfactory textbook on the subject. Sargent's *Manual of the Trees of North America* is by all odds still, and for many years will probably continue to be, the outstanding work on the trees of North America. The book, however, has certain limitations as a textbook for freshman and sophomore students. In the first place, the cost of the book is quite beyond the ability to pay of the average college student; in the second place, the common names used by Sargent are at variance with those used by the Forest Service; and thirdly, it seems to be quite difficult to stimulate in freshman and sophomore college students enough interest in trees that they will freely partake of the rather rich and to them largely indigestible intellectual fare found in Sargent's Manual.

For these reasons, Professor Green's book is very welcome. Within its covers is found a large amount of information dealing with the conifers of North America. To be sure, there is little new in the book. There are no scholarly discussions concerning mooted questions of nomenclature. There is no critical analysis of the validity of certain species and varieties. There is little new information concerning the ranges of North American trees. As stated in the preface, this was not the author's purpose. The author set out to compile the available information dealing with the coniferous trees of North America, and this he has done and done it well.

HENRY SCHMITZ,
University of Minnesota.

Astigkeit und Astung (Knottiness and Pruning). A Summary of the Results of Later Works. By H. Mayer-Wegelin, Hann.-Münden. *Sonderabdruck aus Forstarchiv 1932, Heft 15. 6 pages. Verlag M. & H. Schaper, Hannover.*

While sporadic interest has appeared in the subject of forest pruning for more than a century, there still is a lack of much of the fundamental information needed to put the subject on a scientific basis. Seventeen recent German papers on the subject are briefly summarized. In these papers the demand for quality production over quantity production is emphasized, as well as the effect of knottiness upon usefulness. The product of the greatest value was shown to be obtained when the inner knotty core of the log was confined within such narrow limits that the outer surfaces of the two heart boards when 1½ inches in thickness were entirely clear of knots.

Investigations of silvicultural conditions which affect the clearing of branches showed that in spruce slow growth in youth diminished only the white knot

portion of the inner stem, not the zone of black knots. Thus, in thick growing young stands the death of the branches was accelerated, not the weathering of the dead branches. Pruning of dead branches on small trees in general was approved, but late pruning—about 40 years before cutting—did not improve wood quality, rather damaged it. Also, the question of the advisability of pruning trees which produce only wide-ringed wood of low density was raised.

The fundamental questions which require further study include the reaction of different species to natural pruning; the influence of the climate and the soil on the manner and rapidity of cleaning; whether the different artificial pruning methods are harmless under different site conditions; and the relation of pruning to the degree of thinning permitted afterward with respect to the effect upon rapidity of growth. The writer of the article considers the clearing up of such fundamental points of more importance than the establishment of contestible computations in regard to profit.

BENSON H. PAUL,
Forest Products Laboratory.

Journal of the British Wood Preserving Association. Vol. 3. Edited by A. H. Lloyd and R. C. B. Gardner. *166 Piccadilly, London, W 1. 1933. Price 7s 6d.*

The American Wood Preservers' Association was organized almost 30 years ago. During the 30 years of its existence, it has served with distinction the wood-preserving industry and the American public. One need only to glance through one of the later numbers of The Proceedings of the Association to become favorably impressed with the technical and scientific foundations upon which the work of the Association is based.

Just three years ago, the British Wood Preserving Association was organized. To a considerable extent, it seems to have been patterned after The American Wood Preservers' Association. In the three years of its existence, the British Wood Preserving Association has made splendid progress as attested by the technical and scientific contributions to its *Journal.* The titles of these contributions in Vol. 3 of the *Journal* of The Association are as follows:

Timber Preservations from the Estate Agent's Point of View. By Sidney A. Kelly; Some Experiments in the Control of Dry-Rot in Floors. By Alex H. Dewar; Paint and Varnish as Wood Preservatives. By L. A. Jordan; The Preservation of Railway Sleepers. By J. Bryan; Preservative Treatment of Douglas Fir Sleepers in The Sudan. By J. Thomson; "Preserve your Timber and Save your Purse." Research in Wood Preservation at the Forest Products Laboratory, Prince Risborough, England. By Dr. R. C. Fisher; Preservation by Fire; Treatability of Some Home Grown Timbers; Durability of Treated Sleepers in An Estate Railway; Research Institutes and Forests Products Laboratories in Which Work on the Preservation of Timber is being Carried out; Works Reviewed in Various Technical Papers; Short Notices of Books, Pamphlets, etc.

American lay readers will not be greatly interested in all the articles in the *Journal* because they deal with conditions quite different from those met with in America. For example, Mr. Dewar's article on the "Control of Dry-Rot in Floors" deals with a type of floor construction quite different from that generally used in America. American readers will be interested greatly in the advertisements in the *Journal.* The comparatively large number of advertisements of proprietary wood preservatives is especially striking. Although such preservatives are not un-

known in America, they do not seem to have received the same recognition in this country as they apparently have received in England.

American foresters wish The British Wood Preserving Association a long life of useful service.

HENRY SCHMITZ,
University of Minnesota.

Establishment, Growth, and Influence of Shelter Belts in the Prairie Region of Minnesota. By E. G. Cheyney. *Bulletin No. 285, Agricultural Experiment Station, University of Minnesota, St. Paul, Minnesota.*

In Minnesota's prairie region the windbreaks planted by the pioneers forty to sixty years ago are now largely decadent. The present generation of farmers are making very little effort to replace these dying windbreaks. In the forest area the cut-over land farmer, as a result of his fear of fire cleared the land around his home site thus exposing it to the sweep of the wind. Since almost all our Minnesota farms are in need of windbreak and shelter belt planting Cheyney has made a welcome addition to Minnesota forestry literature.

This bulletin is based largely on studies made by the author of the old windbreaks and the young demonstration windbreaks set out seven to ten years ago under the direction of the Division of Forestry, University of Minnesota.

All species hardy in northern Minnesota are also hardy in the southern part of the state. Green ash, *Fraxinus pennsylvanica var. lanceolata*, appeared to be the thriftiest species and the freest from injury of all kinds.

Eastern cottonwood, *Populus deltoides*, has made the best diameter and height growth. Of the conifers European larch makes the fastest growth. Scotch pine, Norway spruce, Norway pine, white pine and balsam fir make a fairly rapid growth.

The moisture content of soil samples taken within windbreaks are consistently lower than samples taken outside. On the whole, the temperature of soil at both one foot and two feet below the surface is 21 degrees C. higher out in the open than within the grove.

The windbreak is responsible for a very decided decrease in wind velocity. This influence extends at least ten tree heights to the leeward.

Cheney's relative humidity readings indicate that windbreaks if numerous enough may be an important factor in raising the relative humidity of the air in prairie regions.

The author's tables as to height growth at different ages and under different degrees of cultivation show that as a rule cultivation pays.

The bulletin contains 26 tables summarizing the data taken during the author's studies. A discussion of the comparative value of species adds to its value.

This bulletin will be a welcome addition to the library of the forester, county agent, interested in this subject. It does not, however, meet the need for a popular bulletin for general distribution to our Minnesota farmers.

L. B. RITTER,
Blister Rust Control, Minnesota.

Pruning in Plantations. By W. H. Guillebaud. *Quarterly Journal of Forestry, Vol. 27, No. 2, pp. 122-150.*

Fresh impetus to forest pruning in England has been given by the desire of Post Office authorities to obtain home-grown Scotch pine for telegraph poles, Investigations in the forest of Dean are reported. They deal with the efficiency of various pruning tools, pruning methods,

and the relative cost of pruning different species of trees at different ages.

Tools used are: (1) Straight-bladed hand saw (six teeth to the inch); (2) curved saws 16 to 20 inches in length with teeth set to cut only on the downward stroke. Fitted for attachment to poles of varying lengths (four or six teeth to the inch); (3) tree pruners; (4) pruning chisel; (5) mace; (6) hackers; (7) pruning shears; (8) larch hook (a blunt edged iron hook used for stripping the dead branches of larch); (9) Swedish knife pruner; (10) extension ladder; (11) climbing irons; (12) safety belt; and (13) extension poles.

Trials are reported for stands of Douglas fir, Norway spruce, Sitka spruce, Scotch pine, Corsican pine, European larch, and oak.

Based upon the experimental work done the following table of costs of pruning at different ages and to different heights is presented for four of the species named:

With the exception of Scotch pine an extra price of well under 1d. per cubic foot on the final crop will repay the cost of pruning based upon an average pruning cost of 3d. per tree. In the case of Scotch pine an increased cost would have to be from 1½d. to 2d. per cubic foot. It is suggested, however, that in trimming out and peeling telegraph poles an appreciable proportion of the cost of pruning is likely to be recovered in the lower cost of preparing the poles from pruned trees.

The equipment found most suitable for pruning to a height of 15 to 18 feet in young plantations consists of the heavy hacker and mace for brashing (breaking dead branches from the lower portion of the tree), hand saw, Swedish pruning knife, and stout-bladed curved pruning saw on an extension pole. For pruning older plantations a 25-foot extension ladder, safety belt, and climbing irons are needed in addition.

The selection of trees to be pruned depends upon the object, the age, the species, and the type of trees in the stand. Timing tests in Douglas fir showed that, given trees of the same girth and height in the same plantation, a coarsely branched tree may take three times as long to prune as a finely branched tree. Where the choice exists, typically codominant, clean grown trees should be selected for pruning.

The stage for beginning pruning is not definitely recommended. It is cheaper to prune to a height of 18 to 24 feet in one operation, but there are advantages and disadvantages of earlier pruning. The height of pruning depends upon the object. For lumber production up to 30 feet, for the longer poles up to 40 or 50 feet if locally grown poles come into greater use.

Pruning the first whorl of living branches is not considered inadvisable.

It is considered safest to prune trees while they are dormant, but no objections are raised to pruning dead branches at any season.

BENSON H. PAUL,
Forest Products Laboratory.

TABLE 1

ESTIMATED COST PER ACRE (IN SHILLINGS) OF PRUNING

Height of pruning, feet	Douglas fir	Scotch pine	Norway spruce	European larch
1. Young plantations (15-20 years), 350 trees pruned per acre.				
10-12	35	20	23	6?
2. Young plantations (25-35 years), 240 trees pruned per acre.				
12	24	10	16	4?
18	40	22	34	4?
24	60	38	45?	6
30	90	66	?	?
35	120	?	?	?

CORRESPONDENCE

The Profession and the Society

Editor, Journal of Forestry
Dear Sir:

One may agree with Professor Chapman[1] that the Society must take a firmer stand towards preventing political domination of forestry activities. But need we conclude that this can be accomplished only by limiting the effective representation of publicly employed—specifically, federal—foresters in the councils of the Society?

If federal employees are handicapped in publicly condemning political chicanery and patronage, how much more so are foresters in state, school, and private employ, who have perhaps less security of tenure than that provided by civil service. Also, since the bulk of the profession, and of the membership in the Society is engaged in some form of public or quasi-public activity, only a mere fraction of the total would be eligible for office if Professor Chapman's recommendation were consistently applied.

Whatever freedom of expression might result from such a move would to my mind be more than offset by the evils resulting from vesting control of the Society in a small group inadequately representative of the many professional activities and viewpoints. After all, forestry in this country is still essentially a public function and most foresters are public servants. Should forestry employment extend greatly to private activities no doubt the proportionate representation of public foresters would decrease.

I assume that we desire primarily public spirited leadership. By this I mean leadership that concerns itself less with the assertion of narrow sectionalism and the rights of special interests than with fundamental task of advancing the widespread practice of forestry. If this be granted, I fail to see how federal foresters are less qualified than state, school, or private foresters.

I believe that it is up to the membership of the Society to select its leaders from among those individuals who display courage and vision regardless of the type of employment they are in. Selection merely on the grounds of age and narrow technical or administrative attainment alone is not enough. It might be wholesome if the views of the nominees for the Council in such matters as are of vital importance to the Society were clearly made known to the membership. This would help us to achieve better the standards aimed at.

As the first step in clarifying the aims of the Society I would like to see a restatement of guiding principles submitted to the membership for their information and discussion. No doubt many of the younger men would gain a new appreciation of what the profession means to them. I heartily agree that if we are to rise above trade levels we must be interested in more than technical achievement. Membership in the Society should carry with it definite ethical obligations as well, and every member should be expected to fulfill them. The Society should then be just as ready to deny the privilege of membership to those who are unwilling to carry these obligations as it is to defend its members from dismissal.

Even then the Society may be helpless

[1]Chapman, H. H. The Profession and the Society, Jour. For., Oct., 1933, pp. 726-731.

for the present to correct the abuses to which Professor Chapman alludes. Perhaps we could accomplish more by pressing vigorously, in concert with other organizations, for the extension of civil service to *all* public functions, whether permanent or of an emergency character.

No doubt this will be a hard task, but after all is it not the most effective solution.

BERNARD FRANK,
St. Paul, Minn.

FORESTRY LEADERSHIP

Editor, JOURNAL OF FORESTRY
DEAR SIR:

The editorial in the October JOURNAL, by Ward Shepard, partially explains why the forestry profession has failed to influence the private timberland owner. Too many of the foresters have been living in a dream world of their own and have been rationalizing their wishes rather than facing the real facts of a hard world.

Just what does he mean by "forestry leadership?" Does he mean that we lack men who can influence the public to demand better forest management? What is the matter with our national and state forest services? Are our forestry schools not training men properly for the work they have to do? Apparently he is perfectly satisfied with all of these agencies. His only complaint is that none of them have done anything successfully to persuade the private owner, who is trying to make a living, to practice forestry. He asks for another board or commission, a super one, a "Federal Forest Council" to unite all of the existing agencies for a combined attack on the poor forest owner. And that after he has been held up as a devastator and a public enemy. Has the failure of prohibition taught us nothing? People can not be made law-abiding by passing laws nor will writing out forest policies make the woodlands owner practice forestry. You cannot stand a pyramid on its apex. The timberland owner, like every other business man, wants to earn a profit on his investment, and if he can be shown that forestry practice will help him do this he will be all for it. He has got to be educated. You must prove to him that a dollar spent in fire protection, better logging methods or the use of silvicultural methods will return a dollar and ten cents during his business lifetime.

This we have been able to do in cruising, in protection against fire and insects and in logging. But in silviculture which is the whole of forestry, which shows how to produce the heaviest crop of timber in the shortest time, we have failed, partly because we have not believed in it ourselves and partly because we have tried to sugar-coat the bill by talking about minimum silvicultural requirements and the like. We have urged sustained yield management and selective logging, but when asked for practical instructions and how much such measures would add to costs per cord or per thousand board feet we have had no answer ready. Neither have we had the courage to come right out and say that money spent for forestry measures is only justified, from the investor's standpoint, on the best sites and within economical hauling distance of the mills.

We have talked about a timber famine to frighten people into the practice of forestry and now we find that the private owners have so much timber that it is a drug in the market and that they cannot afford to pay carrying charges, but must cut and sell it at a loss to keep out of bankruptcy. We have hardly been able to do anything to reform the tax laws in regard to timber, one of the first essentials to profitable timber growing.

When Shepard says "the failure of private ownership" he speaks only from

the standpoint of the forester and perhaps the general public. Until recently private ownership has been very successful. Many men have made nice fortunes out of their investments in timber, in fact they have of their abundance done more than anyone else for forestry through propaganda. They have not been interested in the future of the forests any more than those who owned mines and oil wells. They expected to mine their timber. They did not want to leave it to their children, they preferred government bonds. Why should the timberland owner reduce his profit to serve the public good. No one else does it.

At first we tried to persuade our clients to practice forestry by telling them how it was done in Europe and we did not always know the truth about that. In Europe they have never tried to lay down the law about how forests should be managed, they have only been able to limit the cut and in some cases make a man plant if he did not get satisfactory natural reproduction.

The national government and the state governments can afford to practice forestry because the taxpayer furnishes the money. The private owner has to sell his timber for enough to pay all charges. He has to meet competition which is continent-wide. He wants the forester to tell him definitely how much it will add to his costs to use silvicultural methods just as he wants to know what his logging costs will be. Few foresters can answer and unfortunately the ones who are most insistent that the private owner should do something are those who have never had to make a dollar out of a forest in their lives.

Why can't we stop being sentimental and be straightforward. Why can't we say right out that the private owner can never afford to practice forestry until he can get a price for his product which will give him a profit. If the consumer will pay he will soon take all the advice the foresters have to offer.

There is only one other way, buy out the private owner and either lease the forests to him or operate them governmentally and let the taxpayers pay the piper.

ELLWOOD WILSON,
Ithaca, New York.

Editor, JOURNAL OF FORESTRY
Washington, D. C.

DEAR SIR:

May I trouble you to publish a correction of an inference to be drawn from Mr. C. M. Granger's letter as published on page 869 of the November 1933 issue of the JOURNAL OF FORESTRY.

The New York Section did not at its fall meeting and has not at any other meeting passed any resolution advocating or endorsing or opposing the specific candidacies of any of the nominees. In fact, the New York Section went on record as being definitely opposed to any such course of action but requested that an informative letter covering all phases of the situation brought up by the action of the New England Section be placed in the hands of each member of the New York Section for their own guidance and judgment.

Yours very truly,
HAROLD CAHILL BELYEA,
Secretary, New York Section, S.A.F.

Editor, JOURNAL OF FORESTRY
Washington, D. C.

DEAR SIR:

With reference to the review of our Bulletin No. 4 "A Portable Charcoal Kiln" which appeared in the JOURNAL OF

FORESTRY for November, 1933, there is an error in the closing sentence of the next-to-the-last paragraph.

Mr. Rees (the reviewer) states that "The author states, however, that in regions beyond reasonable freight haul for distillate charcoal, it is impossible to operate these kilns at a profit." On p. 34 of this Bulletin you will find this sentence; "Where, however, an operation is favored with a market located beyond reasonable freight haul for distillate chan coal, it is entirely possible to run these kilns at a slight proft. . . ."

The possibility of profitable operation under the foregoing conditions was one of the important points which we desired to stress. Would you be so good as to insert this correction in the JOURNAL?

Yours sincerely,

HENRY H. TRYON, *Director,*
The Black Rock Forest

SOCIETY AFFAIRS

Doings of the Executive Secretary October 11—November 10.

The Society was honored by an invitation to its Executive Secretary from the President of the Association of State Foresters to participate in its annual meeting, October 15 to 18, in Indiana. Since practically all the state foresters are Society members this afforded admirable opportunity to make personal contact with them and reap the benefit of their individual ideas and suggestions concerning the conduct of Society business and its plans and policies. On the trip through Indiana a number of the E. C. W. camps were visited in the state parks and forests and a chance was thus given to make the acquaintance of several of the recent forest school graduates, now engaged as woods superintendents and foremen in the C. C. C. work and to stimulate their interest in Society membership.

October 24, 25 and 26, were given over entirely to the conference on Article X of the Lumber Code. Since the Executive Secretary is one of the officially appointed conferees, much of his time, prior to those dates, was taken up in coöperation with those responsible for planning and carrying the meeting through. Subsequently, being secretary of one of the six conference committees, and also secretary of the executive, or steering, committee elected by the conference, he has had to devote no small amount of his working and leisure hours to the work of "mopping up" after the meeting and of helping to get things lined out in the right direction toward the second and final session of the conference in December. Such activities, combined with the regular duties of conducting Society business and serving as Editor of the Journal have rendered it difficult, and at times, impossible, to keep within the rather restricted working hours prescribed by the "Blue Eagle." Undoubtedly, a thirty, forty, or even a forty-eight hour working week is only for those whose duties are of the purest automatic routine nature, and no member of the Society's executive staff falls within that category. They all have to use their brains in everything they are called upon to do. If ever a "job-load analysis" investigation should reduce the work of the Society's executive office to that low level, no position in it, and least of all that of the Executive Secretary, would be attractive to anyone at all competent to fill it.

The Society's office is steadily gaining recognition as headquarters for members visiting Washington. Among the callers of the past thirty days were: W. A. Dayton, Secretary, Washington Section; Verne Rhoades, Public Works Administration; W. C. Lowdermilk, Assistant Director, Bureau of Erosion Control, Department of Interior; E. T. Allen, Western Forestry and Conservation Association; W. L. Hall, Consulting Forester, Hot Springs, Ark.; C. S. Chapman, Weyerhaeuser Timber Company; R. E. Benedict, Brunswick, Ga.; S. T. Dana, Michigan School of Forestry and Conservation; J. P. Wentling, Western Cedar Pole Association, Minneapolis, Minn.; G. H. Collingwood, American Forestry Association.

Franklin Reed,
Executive Secretary.

Committee on Nominations

The Committee on Nominations, composed of H. P. Brown, *Chairman*, Willis Baker and Swift Berry, wish it to be clearly understood that the form of ballot, and instructions how to use it, for the coming election was prepared under the direction of the President, and not by the Committee on Nominations.

Franklin Reed,
Executive Secretary.

A More Representative Council

The present system of elections in the Society of American Foresters is under criticism for two principal faults;—first as providing a poor system for selecting a president and vice-president, second, for failure to obtain a council fairly representative of the Society. The former it is hoped may soon be remedied by a method of election enabling direct choice of the officers. The latter which can be corrected by some system of proportional representation is the subject of the present discussion.

A proposal of the Allegheny Section,[1] mentioned in the October number of the Journal, would base representation in the council on the number of members, dividing the country into 8 districts, each containing approximately the same number of members and allocating one seat in the council to each district. There are eight council members, exclusive of officers. The argument that representation should be based not on geographical location but upon the fields of professional activity (classes of employment in other words) has also been advanced. Fields of professional activity in forestry might for example be classed broadly as federal, state, education and private forest industry. Presumably representation on the council would be proportioned among these fields upon the basis of numbers of members engaged in each activity.

While considering these various proposals it might be interesting to see how the existing system of elections is working out. For this purpose the present membership of the council and a list of the 23 accredited nominees to be voted upon in December 1933 were classified in several ways as shown in Table 1.

Evidently on the basis of numerical proportion the Wisconsin, Minnesota and Ohio Valley group and the Rocky Mountain group have not had adequate representation, while California and the New York—3/5 Allegheny group should each have one nominee elected. If the analysis is made by sections (not shown in detail in the table) it develops that the North Pacific, Washington and New England Sections each have two representatives on the present council and hence in fairness to others do not rate any of the places to be filled at the 1933 election, even though in each case one of these representatives is retiring in December 1933. The Appalachian-Southeastern-Gulf States-Ozark group has two council members holding over. The Rocky Mountain group is the only one in the list failing to present nominees and hence being without a chance of getting representation in the 1933 election.

Tabulation by fields of professional activity indicates that private forest industry has been inadequately represented (in fact not represented at all for the last two years at least), while education has been over-represented. Unfortunately the writer has not available the number of members in the different activity groupings. It is believed that analysis will show educaton entitled to either one or two representatives on the council, instead of the present four, federal to at least half of the council (which is close to its present representation), with the

[1]Allegheny Section News, Jour. For., October, 1933, p. 743.

balance divided between state and private forest industry.

But what are we likely to get as a result of the election now under way? Certainly a council fairly representative of the Society either geographically or by fields of activity is too much to expect. Some interesting combinations of unbalanced representation might result; such for instance as the election of Fritz, Kotok and Woodbury, respectively classed as in education, federal (research) and federal (administration), with all three men coming from San Francisco. A second possible combination would be Hawes, Ross and Chapman all from Connecticut and closely associated in connection with the state's forestry work. Or perhaps Clapp, Kneipp and Morrell may join Granger on the council. Such a combination, even with the addition of two more federal men, probably would not make a larger representation than the federal activity is entitled to. But would it be desirable to have the federal representation largely concentrated in Washington in the shape of four of the high officials in the Washington office of the U. S. Forest Service on the Council at the same time?

In spite of the fact that every one of the men named as well as all the other nominees are highly competent men of council-membership calibre it would be unfortunate if any of these combinations or certain others which might occur, should result from the coming election. Even though none of these combinations actually are elected the possibilities under the existing election system of obtaining a non-representative council are too real to warrant further delay in re-

TABLE 1

CLASSIFICATION OF PRESENT COUNCIL AND NOMINEES

Regional grouping by the sections	Approximate number of members	Council members		Nominees from which 6 council members will be selected in December, 1933
		Retiring in 1933	Holding over to 1935	
California	213	1		3
North Pacific and Intermountain	232	1	1	2
Central Rocky Mt., Northern Rocky Mt. and Southwestern	242			
Wisconsin, Minnesota and Ohio Valley	231			4
Appalachian, Southeastern, Gulf States and Ozark	224		2	3
Washington, and 2/5 Allegheny	265	1	1	6
New York and 3/5 Allegheny	266	1		2
New England	235	1	1	2
Total	1,908			
Not included in grouping				
Canada[1]		1		1
Total		6	5	23

GROUPING BY FIELDS OF PROFESSIONAL ACTIVITY

Federal	4	2	11
State		1	2
Education	2	2	8
Private forest industry			2
Total	6	5	23

[1] At this time the total membership in Canada and its regional distribution is not known to the writer.

vising the system. The bad features are inherent in the method of nominating and electing the nominees and are not attributed to any effort on the part of a section or of individuals to gain undue influence.

In conclusion there seems to be no valid reason why membership in the council should not be proportioned on a numerical basis. It is believed that this basis should recognize both regional distribution and field of professional activity. The Allegheny Section proposal for a districting of the country into eight regions each allotted a seat in the council is excellent but should be supplemented by a provision fixing the number of seats which may fall in each field of professional activity. The use of such a two-fold basis of allocation offers no insurmountable difficulties in application. Neither regional distribution nor fields of professional activity used alone are likely to prove completely satisfactory, although either would be an improvement over the present system. The two combined as the basis of representation should make possible the securing of a well-balanced council. Definite action in the matter at the annual meeting of the Society is desirable.

R. C. Hawley,
Yale School of Forestry.

Willis Norman Millar

1883 - 1933

Major Willis N. Millar, for many years Professor of Forestry at the University of Toronto, died suddenly of heart disease on June 29 while serving as superintendent of the C.C.C. Camp at Martinsville, Monroe County, Indiana. He is survived by his wife, Mrs. Isabella Underwood Millar, and four children, namely, Lucy Elizabeth, Dorothy, Robert Bruce, and Norman.

Millar enjoyed a most excellent and broad background of experience and contact with the woods for his services as a teacher. This experience carried him into the South, as forest supervisor in the West for several years, then in the western Canadian provinces, and finally he joined with the Regiment of 10th Engineers (Foresters) and served with distinction in France during the World War. He held a Major's commission at the time of his discharge when he returned to his services with the Faculty of Forestry, University of Toronto.

Millar was born in Pittsburgh, Pa. He was of Scotch ancestry. He graduated from the University of Pennsylvania with the degree of B. S. in 1906, and from the Yale Forest School with the class of 1908. Immediately upon graduation from the Yale Forest School, he went to the Kaniksu National Forest in northern Idaho and became the first forest supervisor of his class most of whom entered the Forest Service. He was married on June 29, 1908, in Pittsburgh to Miss Lucy May Cook who later died.

Finding the Kaniksu Forest in a somewhat disorganized condition, he threw his entire energy into its reorganization and development. He left the U. S. Forest Service on March 13, 1912, to become an inspector of forest preserves in the Forestry Branch of the Department of the Interior in Canada. Later he became associated with the Faculty of Forestry at the University of Toronto which position, with the exception of his World War services, he held until the summer of 1933 when he entered the C.C.C. program.

Millar was a man of outstanding personality, ability and individuality. He was quick in perception, very incisive and penetrating in his mental grasp of problems, and balanced in discernment. He represented the very best of the many fine qualities of his Scotch ancestry. Tireless in his energy, he gave his best at all

times. He was very much in love with the woods for he spent many of his week-ends and vacation periods in exploring new places, in becoming better acquainted with the forests, and in studying problems at first hand. As a teacher he became endeared to most of his students because of his logical presentation of the subject which was based upon an excellent and broad background of practical training and experience in the woods. His familiarity with forest conditions throughout North America made him one of the outstanding teachers in this respect.

His classmates at the Yale Forest School look back upon him as a genius of energy and ability. He was always a most congenial companion in the woods and an interesting lecturer on forestry subjects. He was known as an untiring, interesting, and sound teacher. He was an individualist in expressing his own ideas. His judgment was always respected because it was based upon wide experience and sound thinking. He was a regular attendant at the meetings of the Society of American Foresters, of the Yale Alumni, and of various regional and local organizations.

In college he was a brilliant student and always did his work efficiently and promptly. He was an exemplar of the practical forester who devoted his later years to teaching. His special subjects were forest mensuration and certain phases of forest engineering. If there was a bridge to be built, a ranger district to be reorganized, or a timber estimating plan to be devised, Millar was most proficient and prompt in his decisions as to how best to go about the problem, and he was almost universally right in his decisions based upon his sound judgment. Although he has passed to the Great Beyond his strong personal spirit and vital personality go marching on. His good name and reputation will serve as an inspiration and source of emulation to the many students and friends in the forestry profession who hold him in the warmest memory not only for the work that he did, for his writings, and his teachings, but notably and significantly for the type of man that he was.

NELSON C. BROWN,
N. Y. State College of Forestry.

PERSONALS

Dwight B. Demeritt now with Department of Forestry, Iowa State University has accepted the position as head of the Department of Forestry, University of Maine. Mr. Demeritt will assume his duties at the University of Maine in the fall of 1934.

R. B. Miller has been appointed state forester of Illinois.

Knowles A. Ryerson* has been appointed chief of the Bureau of Plant Industry, effective January 1. He will succeed Dr. W. A. Taylor,* who retires the first of the year after 42 years' service with the Department of Agriculture.

* Not a member of the Society.

SECTION NEWS

Appalachian

The section will hold its annual winter meeting at the Vance Hotel, Statesville, N. C., January 5 and 6.

California

A business meeting was held at Giannini Hall, Berkeley on November 3. The following officers were elected for the 1933-1934 season: George H. Cecil, *Chairman*; Jay H. Price, *Vice-Chairman*, and Russell W. Beeson, *Secretary-Treasurer*. There was a good deal of discussion as to whether an annual meeting of the section should be held in December, as E. C. W. and NIRA programs will be heavy this winter and many foresters will have little time to spare from their regular duties. The opinion of the members present was that the benefits to be derived from an annual get-together was great and the meeting should be held. As time for the preparation of papers will be limited, this method of presentation will not be used. Instead, discussion leaders will be appointed to direct the discussion on each subject. The Hare system of electing officers for the parent society was carefully considered. It was the group opinion that this system of electing officers and council members has not been successful and apparently never will be in securing full representation for each region of the country and in securing men best fitted to hold office. A motion was passed unanimously recommending to the parent society the appointment of a committee to study once more the system of electing officers and council members.

Central Rocky Mountain

A business meeting of this section was held in Denver on October 13 for the purpose of acting on several matters which have been held for section action during the past summer.

A motion was passed nominating Earle H. Clapp, Assistant Forester, U. S. Forest Service, for the Schlich Memorial Award, in recognition of his responsibility in the preparation and editing of material for the "Copeland Report," the most comprehensive report on forestry conditions in the world.

The Executive Committee of the section was authorized to endorse applications of forestry school graduates for membership in the Society. Applications, other than these, and those for senior membership will be acted upon in section meetings.

It was agreed that section boundaries conform to those of Region 2, i. e., all of Colorado, Wyoming except the area embraced in the Yellowstone and Grand Teton National Parks, and the Wyoming and Teton National Forests; all of South Dakota, Nebraska, and Kansas; and that portion of Oklahoma including the Wichita National Forest.

The section approved the Council's action in regard to placing members of the Society in financial distress on the inactive list. Mr. M. W. Thompson, Assistant Regional Forester, Denver, Colorado, accepted the appointment to serve as reporter of section news for the JOURNAL.

A tentative schedule of meetings for the winter of 1933-1934 is as follows: Novem-

ber 21 at Denver—Discussion of Brush Disposal in the Rocky Mountain Region; in January at Denver at the time of the annual meeting of the Regional Investigative Committee—Discussion of Thinnings in the Rocky Mountain Region; in February at Fort Collins at time of annual foresters banquet at Colorado Agricultural College—Program in charge of Forestry Club of C. A. C.

New York

The mid-winter section meeting will probably be held in Albany, N. Y., on February 2, 1934.

Ohio Valley

The annual meeting of the Ohio Valley Section was held at the Higgins Lake State Forest in Michigan, October 12, 13, and 14.

In addition to the regular business meeting, Mr. L. R. Schoenmann, Director of the Michigan E. C. W. work, gave the address of the evening which concerned itself with the organization of the Michigan Department of Conservation and its relation to the E. C. W. program. He showed how the economic survey for Michigan of which he was the former director, had given them considerable basic information which has proven invaluable in the establishment of the various types of camps. At the conclusion of his talk he invited questions concerning the proper land utilization policies which are arising under the present emergency. A very lively discussion was entered into by the group, and the relative merits of private ownership of hunting areas versus the public ownership of hunting areas played an important part. The matter of subsistence farming, very similar to that outlined by Mr. Hawes of Connecticut, also came up at this meeting.

On October 13, Professor Don Matthews of the University of Michigan gave an interpretation of Article X of the Lumber Code. He took a specific case and followed it through, showing what the operator would make under former conditions and then revamped his figures in accordance with the conservation provisions of the lumber and timber products code. There were many questions from the floor in regard to the various provisions of the code and as to the possibility of these features working out.

RESOLUTIONS ADOPTED

Three resolutions were adopted. The first resolution urged responsible authorities to develop an educational program for the large number of young men engaged in E. C. W. work, in order to inform these men about forestry and conservation and also to afford them opportunity in some planned and described fashion of advancing their education along these lines of interest. The second resolution urged: first, the continuation of E. C. W. work; second, that this work be continued upon the high plane under which it was inaugurated; third, that to this end all tendencies toward political interference in the selection of supervisory and facilitating personnel be eliminated; and fourth, copies of this resolution be sent to the responsible federal officials. The third resolution conveyed an expression of gratitude to Chairman Shirley W. Allen, the Michigan Department of Conservation, and the federal forest service for their hospitality and for the splendid program which was provided.

The Section went on record as being opposed to the Hare system of representation electing Council members. The result of the election of officers for the ensuing year are as follows: Stanley S. Locke, Chairman and T. E. Shaw, Secretary-Treasurer.

Washington Section

Over 40 members attended the first meeting of the Washington Section since last spring, held in the Cosmos Club

Thursday evening, October 19th, where a liberal supply of Lumber Codeing was supplied to all. The announced speaker, Mr. C. Arthur Bruce, Executive Officer of the Lumber Code Authority, was unable to attend on account of illness and Mr. C. C. Shepherd of the Louisiana Lumber Company, a member of the Code authority, pinch-hit very acceptably. Mr. Shepherd sketched the history of the Code from the time 50 men, representing various regions and phases of the lumber industry, met in Chicago in June and formed an emergency national committee until the code was adopted two months later and signed by the President. He said it was the second large industry to file a code under the NIRA and the largest industry at that time to file a code. The lumber men, he said, were proud of their code and it has been the recipient of high praise from outsiders, many of whom consider it one of the best codes which have been framed. Mr. Shepherd referred to legal difficulties and other obstacles surmounted in the framing and administration of the code, to regional administration of the code by the industry itself, to the constant endeavors to protect the small as well as the big operator, to production allocations, hour and wage adjustments, to Johnsonian "goldfish bowl" publicity methods, and to the adoption of the cost recovery principle as a temporary expedient to protect the industry. After some general discussion of Mr. Shepherd's address and the transaction of routine business the meeting adjourned followed by a social hour with refreshments.

Announcement of Candidates for Membership

The following names of candidates for membership are referred to Junior Members, Senior Members and Fellows for comment or protest. The list includes all nominations received since the publication of the list in the November JOURNAL, without question as to eligibility. The names have not been passed upon by the Council. Important information regarding the qualifications of any candidate, which will enable the Council to take final action with a knowledge of essential facts, should be submitted to the undersigned before January 10, 1934. Statements on different men should be submitted on different sheets. Communications relating to candidates are considered by the Council as strictly confidential.

FOR ELECTION TO GRADE OF JUNIOR MEMBERSHIP

Name and Education	*Title and Address*	*Proposed by Section*
Allison, Jack Pa. State, B. S. F., 1933.	Foreman, E. C. W. Camp No. 55. New Gretna, N. J.	Allegheny
Ashbaugh, Leonard J. Univ. of Mont., B. S. F., 1929; N. Y. State, M. F., 1932.	Technical Forester, Upper Michigan N. F., Munising, Michigan.	Wisconsin
Barry, Edward F. N. Y. State, B. S. F., 1928, M. F., 1929.	Camp Supt., C. C. C. Camp 54, Butler, N. J.	Allegheny
Beadell, Henry A. Purdue, B. S. F., 1931; Univ. of Calif., 1931-1932.	Forestry Foreman, E. C. W. Camp 51-S, Henryville, Ind.	Ohio Valley
Boyd, Ellis Fortson Univ. of Ga., B. S. F., 1930.	Cultural Foreman, E. C. W., Pisgah N. F., Greeneville, Tenn.	Appalachian
Berg, Lennart V. Pa. State, B. S., 1933.	Foreman, E. C. W., Lebanon State Forest, N. J.	Allegheny
Bratton, Allen W. Univ. of Maine, B. S. F., 1932.	Cultural Foreman, White Mountain N. F., Camp Gale River, Pierce Bridge, N. H.	New England

Name and Education	*Title and Address*	*Proposed by Section*
Campbell, Seldon W. Pa. State, B. S. F., 1933.	Foreman, E. C. W. Camp 55, New Gretna, N. J.	Allegheny
Cooper, John Warner Univ. of Ga., B. S. F., 1930.	Cultural Foreman, Camp 2, Nantahala N. F., Walhalla, S. C.	Appalachian
Croke, W. Harry Univ. of N. H., 4 years, Forestry Course.	Charge of Survey Crew, Camp Pawtuckaway, Deerfield, N. H.	New England
Davis, Brooke Rosen Pa. State, B. S. 1933.	Foreman, E. C. W. Camp 51, Stokes State Forest, Branchville, N. J.	Allegheny
Dimmick, Robert S. Pa. State, B. S. F., 1933.	Foreman, E. C. W. Camp 55, New Gretna, N. J.	Allegheny
Fountain, James Davis Univ. of Ga., B. S. F., 1933.	Cultural Foreman, C. C. C. Camp F-5, Nantahala N. F., Clayton, Ga.	Appalachian
Giffen, W. Duncan Iowa State, B. S., 1932, M. S., 1933.	Technical Forester, E. C. W. Camp F-12, Glidden, Wis.	Wisconsin
Hall, Albert G. Pa. State, B. S. F., 1933.	Foreman, E. C. W. Camp 55, New Gretna, N. J.	Allegheny
Hasel, Frank Conrad Univ. of Mich., B. S. F., 1933.	Cultural Foreman, Pisgah N. F., Asheville, N. C.	Ohio Valley
Hawes, Norman E. Washington and Lee Univ., B. A., 1929; Yale, M. F., 1932.	Project Supt., C. C. C. Camp F-6, Sugar Grove, Va.	Allegheny
Hodgkins, Philip M. Mich. State, B. S. F., 1917.	Foreman, C. C. C. Camp, Laconia, N. H.	New England
Hogan, John N. Y. State, B. S. F., 1930; Yale, M. F., 1931.	Technical Assistant, E. C. W., Park Falls, Wis.	Wisconsin
Holley, Quentin G. Purdue B. S. F., 1932.	Forester, Morgan-Monroe State Forest, Martinsville, Ind.	Ohio Valley
Holroyd, H. B., Kansas State Agric. College; Univ. of Mich., B. S. F.	Industrial Agent, Louisville and Nashville, RR., Louisville, Ky.	Ohio Valley
Kampmann, Tiftcrist Steve Univ. of Mich., B. S. F., 1932; Yale.	Technical Foreman, E. C. W., Park Falls, Wis.	Wisconsin
Kowal, R. Joseph N. Y. State. B. S. F., 1933.	Foreman, E. C. W., Nantahala N. F., N. C.	New York
Lamb, Sam H. Colo. Agric., B. S. F., 1932; Univ. of Mich., M. S. F., 1933.	Forestry Foreman, E. C. W., Hill City, S. Dak.	Central Rocky Mt.
Lerchen, Robert A. Univ. of Mich., B. S. F., 1932, M. S. F., 1933.	Assistant Supt., C. C. C. Camp, Saratoga, Wyoming.	Ohio Valley
Liedman, Louis Jr. Carnegie Tech, 1929-1930; Colo. Agric., B. S. F., 1933.	Assistant Supt., C. C. C. Camp 849, French Creek Camp, Encampment, Wyo.	Central Rocky Mt.
Mandeville, Albert E. Pa. State, B. S. F., 1933.	Foreman, E. C. W., Camp 55, New Gretna, N. J.	Allegheny
McCraw, William E. Univ. of Toronto, B. S. F., 1928.	Logging Supervision, Anglo-Newfoundland Development Co., Ltd., Bishop's Falls, Newfoundland.	New York
Miller, Ivo W. Univ. of Ga., B. S. F., 1932.	Staff Assistant, Wambaw and Black River Purchase Units, Charleston, S. C.	Appalachian
Milnes, George S. Pa. State, B. S. F., 1933.	Foreman, C. C. C. Camp, New Lisbon, N. J.	Allegheny
Moorhead, George R. Pa. State, B. S. F., 1933.	Foreman, C. C. C. Camp 52, New Lisbon, N. J.	Allegheny
Rowland, Charles A. Jr. Univ. of Ga., B. S. F., 1932.	Cultural Foreman, C. C. C. Camp F 9, Lakemont, Ga.	Appalachian
Spoden, F. G. Jr. Univ. of Mich., B. S. F., 1933.	Party Chief, Cumberland Purchase Unit, U. S. F. S., Winchester, Ky.	Ohio Valley
Shumaker, K. I. Purdue, B. S. F., 1927.	Foreman, C. C. C., Henryville, Ind.	Ohio Valley

Name and Education	*Title and Address*	*Proposed by Section*
Titus, Robert U. Univ. of Ga., B. S. F., 1931.	Project Supt., C. C. C. Camp F-5, Unicoi, Tenn.	Appalachian
Van Akkeren, John Jacob Univ. of Mich., B. S. F., 1933.	Assistant Camp Supt., Arlington C. C. C. Camp, Arlington, Wyo.	Ohio Valley
Volwieder, Harry N. Y. State, B. S. F., 1931.	Forestry Foreman, E. C. W. Camp 55, New Gretna, N. J.	Allegheny
Weber, Louis S. Purdue, B. S. F., 1932.	Forestry Foreman, E. C. W. Camp 51-S, Henryville, Ind.	Ohio Valley
Whitsitt, Robert F. Purdue, B. S. F., 1931.	Forester, Div. of Forestry, Indianapolis, Ind.	Ohio Valley
Wise, Harold Franklin Univ. of Mich., B. S. F., 1933.	Timber Cultural Foreman, C. C. C. Camp F-1, Pisgah N. F., N. C.	Ohio Valley

FOR ELECTION TO GRADE OF SENIOR MEMBERSHIP

Baumann, Herman Univ. of Wisc.; Univ. of Idaho, B. S. F., '24. (Junior Member, 1926).	Wood's Supt., Fruit Growers Supply Co., Susanville, Calif.	California
Bedwell, Jesse L. Univ. of Idaho, B. S. F., 1920; Oregon State, M. F., 1924; Yale Ph. D., 1932. (Junior Member, 1925).	Associate Pathologist, Division of Forest Pathology, Washington, D. C.	Washington
Farley, James P. Colo. Agric. B. S. F. (Junior Member, 1928).	Assistant Supervisor, Trinity N. F., Weaverville, Calif.	California
Gerhardy, Carl O. Univ. of Calif., B. S., 1920. (Junior Member, 1923).	Assistant Forester, Los Angeles County Forestry Dept., Los Angeles, Calif.	California
Oliver, Thomas K. Univ. of Calif., B. S. F., 1921. (Junior Member, 1923).	Resident Manager, Hobart Estate Co. Lbr. Dept., Hobart Mills, Calif.	California
Pemberton, James E. Jr. Univ. of Calif., B. S. F., 1921, M. S. F., 1923. (Junior Member, 1924).	Assistant County Forester & Fire Warden, Los Angeles County, Los Angeles, Calif.	California
Probstfield, Edwin Elroy Univ. of Minn., B. S. F., 1923; Yale, M. F., 1924. (Junior Member, 1925).	Acting Research Forester, U. S. Rubber Plantations, Inc., Boenoet, Sumatra, Netherlands Indies.	Minnesota
Smith, Leland S. Univ. of Calif., 1912-1916. (Junior Member, 1928).	Assistant Range Examiner, Tahoe N. F., Nevada City, Calif.	California

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C. H. Coulter, Secretary-Treasurer, Box 411, Lake City, Fla.

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Art.—article; ed.—editorial; rev.—review; art. (rev.)—review of article or book by; n.—briefer article and note; s. a.—society affairs; cor.—correspondence.

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